

# MODEL BUILD WW I WHEELS **AIRPLANE**

THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120

## NEWS

August 1997



### First FLORIDA JETS

Mach 1  
fun in  
the sun

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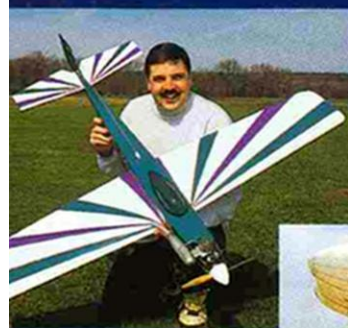
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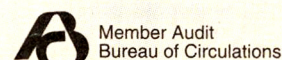
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**ON THE COVER:** main photo—Jim Hiller's Bob Violett Models CT-33 does a flyby at Florida Jets (photo by Larry Marshall). Inset left: Stan Kulesa shows off his Great Planes Kaos (photo by Gerry Yarrish). Inset right: lighter than air R/C. See page 56 for details (photo by Tony Avak).

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# EDITORIAL

by LARRY MARSHALL

## THE QUIET REVOLUTION, PART 2

In the 1980s, Bob Boucher's "The Quiet Revolution" served as the definitive treatise for electric flyers. In it, he described the state of the art in electric-powered model airplanes and provided assistance to those wanting to fly electric-powered model aircraft. Today, electric power is quickly becoming the preferred propulsion system for more and more modelers. But, in discussions with modelers who haven't tried electric power, I often hear them say, "I'll try electric power when there's a breakthrough in battery technology."

Well folks, you just haven't been looking. It's true that there has been no saltatory increase in battery capacity, but the equipment available these days is a far cry from what Mr. Boucher talked about in the '80s. In fact, on a pound-for-pound basis, the power density (power to the prop relative to the weight of the power system) of our modern day electric power systems is at least twice that contained in cutting-edge power systems as recently as 1990—only seven years ago. How can this be, with no large advances? By a whole bunch of little ones, that's how.

Let's look at the cells themselves. In 1990, the maximum capacity of a typical sub-C cell was 1200mAh. In contrast, 2000mAh cells are now available, providing a 65 percent increase in storage capacity with no appreciable weight difference.

We've also seen advances in other parts of our power systems. We use peak-detect chargers to ensure that we get a full charge. The older, timed chargers were best used at around 90 percent of full charge, so the switch to newer chargers has improved cell capacities by another 10 percent. It also means we have to fiddle far less at the flying field.

Speed controllers have improved efficiency, from 75 to 80 percent in 1990 to 95 percent now. Modern cobalt motors are more efficient than the ferrite motors used in the past, and the newer, brushless

motors provide another increment in the power density of our systems because they are more efficient and weigh less. These improved cell, controller and motor efficiencies are additive, so at each point we have improved efficiency between energy storage and thrust production.

Another thing that's happened to improve electric flight success is that the flyers themselves have become much more knowledgeable. We're getting a lot better at matching power systems to airframes. We're making better use of gearboxes to improve motor and prop efficiencies. And most electric flyers are coming to the realization that, as with any other power source, using cheap components doesn't provide good performance. This "Try it with cheap components" idea is still the biggest reason that glow flyers don't realize success when they try electric power, but the increased availability of information is slowly solving this problem.

So how does all this translate to actual model flying? Simple! Electric flyers get more duration and/or much higher

Ribbe has been flying a MiG-15 using a Violett fan spun by an AstroFlight Cobalt 40 rather than a traditional ducted-fan glow engine. Modern F5B "sailplanes" (I don't believe any aircraft capable of 80mph vertical climbs should be called a "sailplane") have simply got to be seen to be believed.

So, I encourage you to take a close look at electric power. It's not for everyone and it's not for every model. But you might be surprised to find, if you give them a try, that you quickly become spoiled by the clean, quiet, absolute reliability of electric power, just as I was.

### FLORIDA JETS

Speaking of alternative forms of power: turbines are cool! Gerry Yarrish and I had the opportunity to attend the first Florida Jets meet organized by Frank Tiano, and the jet fraternity really put on a show for us. The 180+ pilots that this event attracted in its first year, and the positive comments from the pilots regarding the meet, suggest a bright future for Florida Jets. Of course, the aircraft were the stars, as you'll see in our coverage of the event.



Joe Lupton's Jet Hangar Hobbies F-86 at Florida Jets.

performance from their models than they did just a few years ago.

While low-power 7-cell sailplanes are most identified with electric power by those outside the electric community, within that community large, high-performance aircraft like Keith Shaw's Bearcat (84" wingspan, 15 pounds), Dave Grife's D.H. 98 Mosquito (81-inch wingspan, 14 pounds), and Guy Fawcett's scale Fokker D-VIII (84-inch wingspan, 16 pounds) are what we talk about. Dave

We hope you like what we're bringing you in *Model Airplane News*. We can't cover all aspects of R/C aircraft in each issue, but we work hard to maintain a mix that continues to please and challenge you. I invite you to submit your comments and suggestions to us. Tell us what you'd like to see; tell us what you'd rather not see. You can send me email at larrym@airage.com, and letters can be addressed to 100 E. Ridge, Ridgefield, CT 06877-4046. ✦

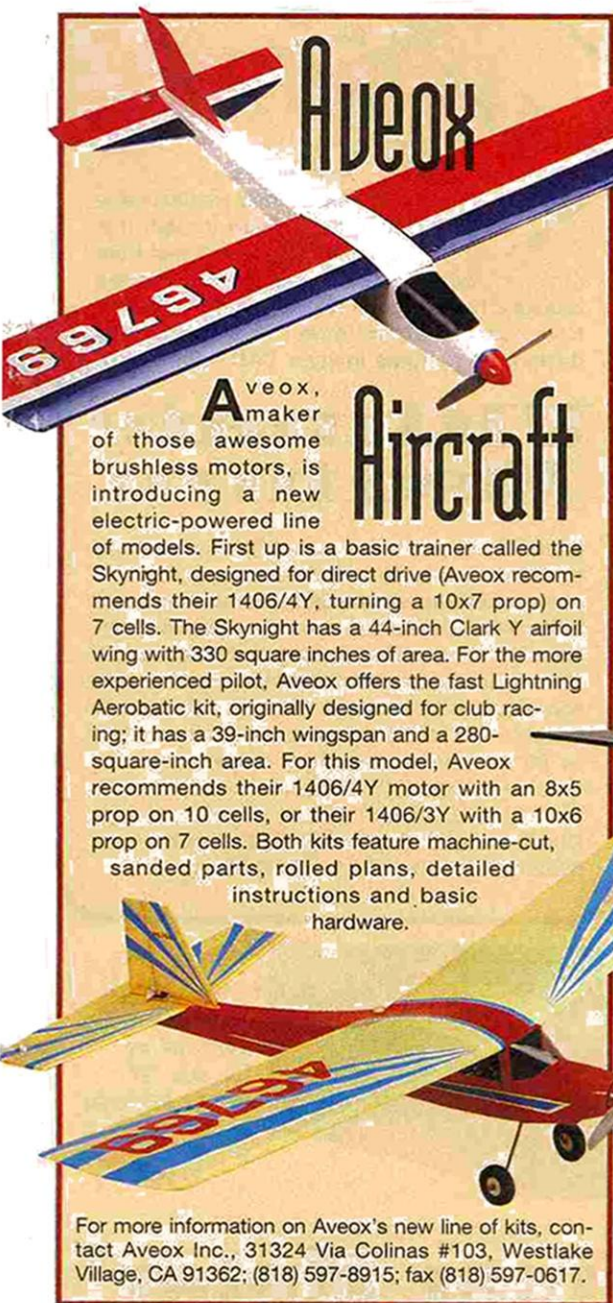




by CHRIS CHIANELLI

# AirSCOOP

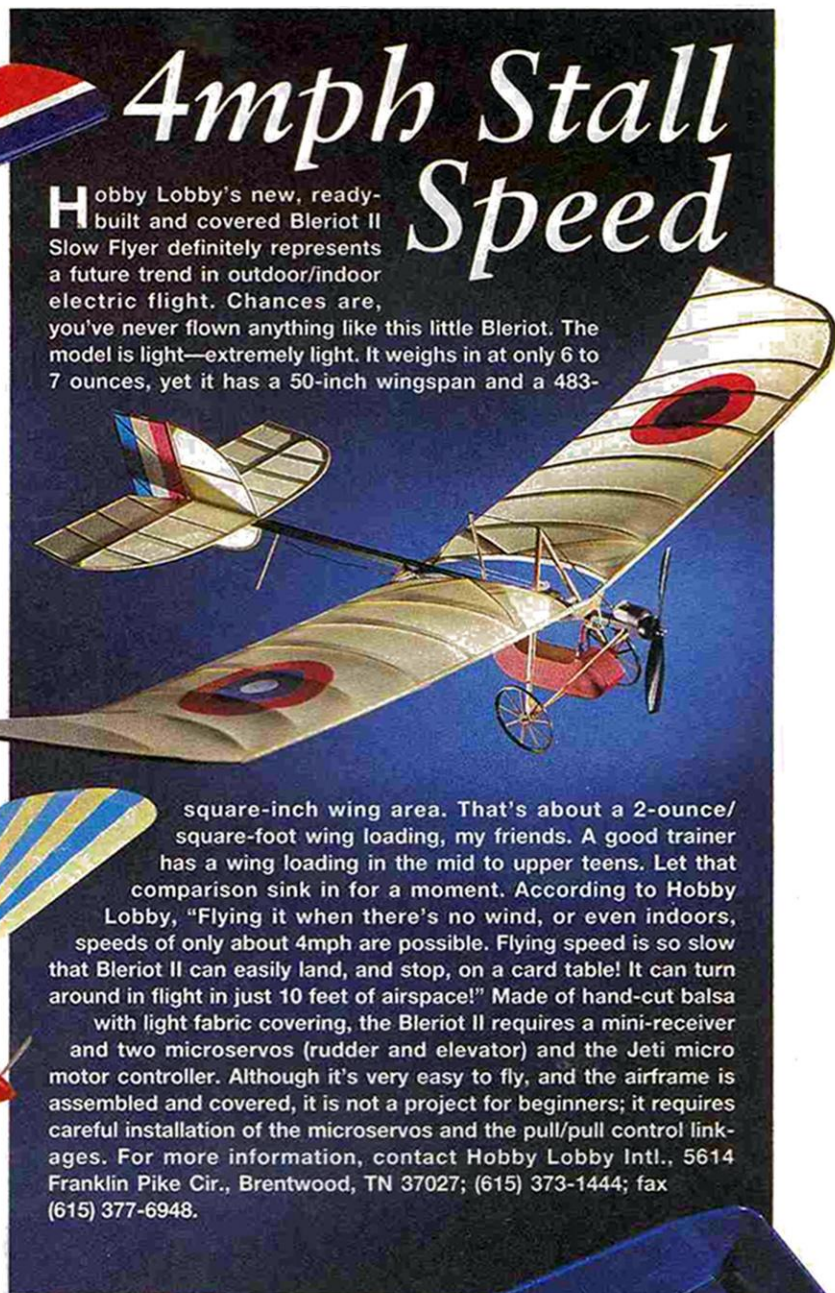
New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!



**Aveox Aircraft**

Aveox, maker of those awesome brushless motors, is introducing a new electric-powered line of models. First up is a basic trainer called the Skynight, designed for direct drive (Aveox recommends their 1406/4Y, turning a 10x7 prop) on 7 cells. The Skynight has a 44-inch Clark Y airfoil wing with 330 square inches of area. For the more experienced pilot, Aveox offers the fast Lightning Aerobatic kit, originally designed for club racing; it has a 39-inch wingspan and a 280-square-inch area. For this model, Aveox recommends their 1406/4Y motor with an 8x5 prop on 10 cells, or their 1406/3Y with a 10x6 prop on 7 cells. Both kits feature machine-cut, sanded parts, rolled plans, detailed instructions and basic hardware.

For more information on Aveox's new line of kits, contact Aveox Inc., 31324 Via Colinas #103, Westlake Village, CA 91362; (818) 597-8915; fax (818) 597-0617.

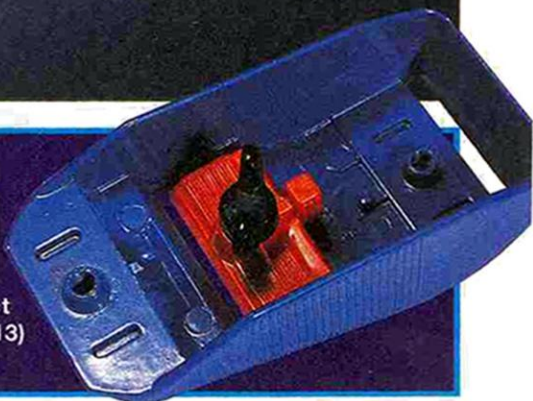


## 4mph Stall Speed

Hobby Lobby's new, ready-built and covered Bleriot II Slow Flyer definitely represents a future trend in outdoor/indoor electric flight. Chances are, you've never flown anything like this little Bleriot. The model is light—extremely light. It weighs in at only 6 to 7 ounces, yet it has a 50-inch wingspan and a 483-square-inch wing area. That's about a 2-ounce/square-foot wing loading, my friends. A good trainer has a wing loading in the mid to upper teens. Let that comparison sink in for a moment. According to Hobby Lobby, "Flying it when there's no wind, or even indoors, speeds of only about 4mph are possible. Flying speed is so slow that Bleriot II can easily land, and stop, on a card table! It can turn around in flight in just 10 feet of airspace!" Made of hand-cut balsa with light fabric covering, the Bleriot II requires a mini-receiver and two microserves (rudder and elevator) and the Jeti micro motor controller. Although it's very easy to fly, and the airframe is assembled and covered, it is not a project for beginners; it requires careful installation of the microserves and the pull/pull control linkages. For more information, contact Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.

## Combi Plane

I just had to show you guys this versatile little double-edged block plane. With its multi blade positions, the Combi Plane can perform smooth-planing, scraper, shaping and corner-planing functions. For more information on this neat little product any modeler can benefit from, contact Dave Larkin, 685 Farmington Ave., Ottawa, Ontario, Canada K1V 7H4; (613) 523-1533; fax (613) 736-8352.

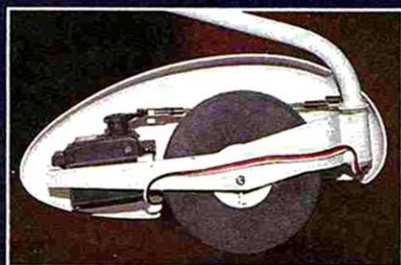






## Gentle **TIGER**

According to North American Power R/C Inc., if you can fly a .60-size trainer, you can fly the Sky Tech Aviation Grumman Tiger. North American states, "The easy-flying airfoil gives great slow-speed handling and makes landing the Tiger a breeze." Sky Tech has already done the hardest work for you; the Tiger has a molded-composite fuselage featuring honeycomb reinforcement and anti-torque bands, pre-sheeted wing and stab cores and capped aileron and elevator cutouts ready for hinging. Seems to me Sky Tech's Grumman Tiger offers a fast and enjoyable way to get into serious giant-scale modeling. The kit also includes a clear canopy, fiberglass cowl and wheel pants and a unique, servo-driven, castoring, steerable nose gear. Specs are: wingspan—93 inches; wing area—1,080 square inches; length—65 inches; weight—15 to 17 pounds; engine—1.8 to 3.2 cubic inches. For more information on this unique subject, contact North American Power R/C Inc., P.O. Box 92638, Southlake, TX 76092; (817) 251-0787; fax (817) 251-0547.



**G**reat Planes introduces their medium-size Ultimate 40. Even though this model spans less than 4 feet from wingtip to wingtip, Great Planes boasts it has the crisp response and agility we have come to expect from this showstopping design. Its features include CAD-engineered,

## Ultimate Medium

interlocking parts that simplify construction, prebent aluminum cabanes, press-in inter-plane struts for super-simple wing alignment at the field, Duraluminum landing gear and all-balsa exterior with ABS cowl and wheel pants for clean, sport-scale looks. Specs are: wingspan—43 inches; area—742 square inches; weight—5.5 to 6.5 pounds; wing loading—17 to 20 ounces/square foot; engine requirements—.40 to .46 2-stroke, or .48 to .70 4-stroke. Contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820; (217) 398-6300; fax (217) 398-1104.



## NEWS FLASH!

HERMANN GOERING  
SHOWS UP AT  
TOP GUN '97  
IN HIS PERSONAL  
JU-52!

FULL REPORT  
NEXT MONTH



## It's Super Meter!

It's a voltmeter, it's an ammeter, it's a wattmeter; no, it's ... it's ... Super Meter!! Not really; that just sounded good. Actually, it's called the "WHAT" Meter, and it's from AstroFlight. It's all these meters, plus an amp-hour meter, rolled into one. AstroFlight's Bob Boucher says the "WHAT" Meter eliminates all the guesswork, so you know exactly what's up with your electric model. This meter will tell you your motor amps (0.1A to 50.0A), motor voltage (0.1V to 60.0V), motor watts (1W to 1000W) and battery capacity (1mAh to 5000mAh). For more information, contact AstroFlight, 13311 Beach Ave., Marina Del Rey, CA 90292; (310) 821-0291.



# Trillium Diablo

**M**ore than two decades ago, Walter Extra made some of his own modifications on a Stephens Akro, the legendary design that also inspired the Laser, the Super Star and many others. Now, Trillium Balsa brings us a new, all-wood, 1/4-scale version of the Diablo featuring CNC-machined parts, rolled plans, an illustrated instruction booklet, aluminum landing gear, a fiberglass cowl and cockpit deck and deluxe hardware, including spinner. Specs are: wingspan—72 inches; length—57.5 inches; weight—7 to 8.5 pounds; engine required—60 to 1.08 2-stroke, or .91 to 1.20 4-stroke. For more information, contact Trillium Balsa Ltd., 260 Tillson Ave., Unit 2, Tillsonburg, Ontario, Canada N4G 3B5; (519) 688-3522; fax (519) 688-3520.



## A W E S O M E



**C**arden Aircraft, known for their quality kits, introduces this impressive 35% Cap 232. Carden reports that the big Cap—like their 300-S—has excellent slow-flight characteristics with superb aerobatic performance, plus it exhibits superior yaw stability on stall-turn down-lines and snap-roll exits. This is the model with which Doug Cronkite captured second place in the Unlimited Class at the '96 IMAC Nationals after only two test flights. People who attended the event reported that the huge Cap's freestyle performance was simply awesome. The kit features a built-up fuselage, foam wing-cores, edge-trued balsa sheeting, removable wing panels with a tube-and-socket system, clear epoxy/glass cowl and wheel pants and accurate plans with detailed instructions and color photos. Specs are: wingspan—102 inches; wing area—1,950 square inches; length—94 inches; weight—approximately 26 pounds; power required—70 to 100cc. Rumor has it that an 88-inch wingspan, 30% version is due this winter! Contact Carden Aircraft, 1404-D Spartanburg Hwy., Hendersonville, NC 28792; (704) 697-7177.



## Designated Driver

**T**he compact EGAS III onboard glow-plug driver is like no other. Compatible with all brands of AM, FM and PCM radios, with 4- or 5-cell receiver battery packs, it features push-button setup and plugs in; it requires no soldering. The EGAS III can be adjusted so that the glow plug will light at any throttle setting. Although turning the transmitter on and off activates the glow plug, EGAS III also has an external, override "on" switch for convenience in the field. Other convenient features include glow-plug-output short-circuit protection and battery reverse-polarity protection, and the glow-plug battery pack charges through a glow-plug connector, which simplifies aircraft wiring. The glow-plug battery can be either a single cell or a 4-cell pack. For more information, contact ISC Intl., 10620 N. College Ave., Indianapolis, IN 46280; (317) 844-1978 or (317) 848-1015.



# AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606; email: man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we can not respond to every one.



## F-84E THUNDERJET

During the 1950s, I was in the Air Force stationed in Germany and worked on F-84Es. I have been a model builder all my life and would like to build an F-84, but I cannot find plans of any kind. The model companies seem to have forgotten the F-84 except for a small 1/72-scale version by Heller Models. I would prefer to build one of wood. I noticed a magazine, which I believe you publish, that has detailed drawings of WW II aircraft. I would like to know whether you have any plans or drawings of the F-84 that I could scale up to produce a model.

The enclosed picture is of one of our squadron planes. The plane was assigned to Col. Robert L. Scott of Flying Tiger fame. He was our Group commander. The paint job was quite unique, as you will note.

I would appreciate any help you can offer. Republic was the manufacturer, and I guess they have merged with another company so I don't know how to contact them.

BILL ASHDOWN  
Monterey Park, CA

You're right, Bill; we modelers have overlooked the F-84E. Model Airplane News published an F-84F Thunderstreak, but that's as close as we've gotten. That model was powered by a Kress fan unit, so if that's your interest, you might get some ideas about how to mount a fan unit and do the ducting for your F-84E from that plan. It's FSP01853 and is available through our plan service.

For the Thunderjet itself, however, the pickings seem slim, but as is often the case, Gus Morphis may come to your rescue. He's got a plan for a 37-inch-wingspan F-84, and you might want to contact him for details at 4709 Green Meadows Ave., Torrance, CA 90505-5507; (310) 378-5679. LM

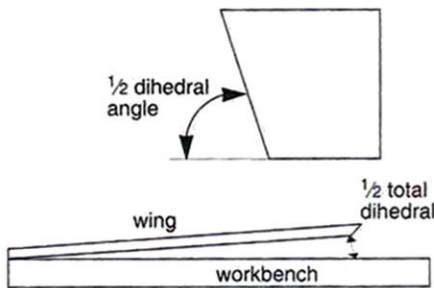
## MEY'S A-6 INTRUDER

I am looking for some assistance in tracking down the address of a kit manufacturer and thought you could be of some assistance. In the May 1995 issue of Model Airplane News on page 79, there is a photograph of an A-6 Intruder built by Les Burfield. The caption states that the Intruder was built from "the Mey's Hi Tech kit."

I have never heard of Mey nor seen any advertisement from their firm. Do you happen to have the address or telephone number so I can contact them and inquire about the kit? Any assistance would be greatly appreciated.

RYAN STANLEY  
Redmond, WA

Hi Tech Models is a small company owned by Eric Mey. Eric is fairly well-known for his scale design efforts, and he sells several really nice glass kits, including the A-6 Intruder you're interested in. His line includes an OV-10, P-51 and Corsair, and he's working on a very large A-37 at the moment. You can reach him at Mey's Hi Tech Hobby, 10 Starr Rd., Danbury, CT 06810; (203) 743-7259. GY



## SAND UNTIL IT FITS

I need some help! I am what you may call "green," as I have built only two kit gliders and rebuilt parts of a gas-powered trainer. I have no problem except with those crazy wing joints, especially a large polyhedral. "Sand until it fits" doesn't help. I sand until there is nothing left to sand, and they still don't join right. Further, when they finally seem to fit at the top, I find later they don't fit at the bottom. This realization comes after the epoxy dries. All I can do is fill in the gaps with baking soda and cyano. Please give me some advice; I have difficulty every time.

SHAWN LAROCQUE  
Leduc, Alberta Canada

There are two ways of getting the ribs at a dihedral break to mate at the proper angle. The first is to install them at the proper angle, eliminating the need for lots of sanding. This is the preferred method in my view and requires only that you produce a template, generally made from a scrap of plywood, that is angled so that it reflects 1/2 of the desired dihedral (1/2 of the angle will be put into each wing panel). With the ribs installed, using this simple template to align them, they will combine to provide the proper dihedral angle.

Ribs installed upright, however, must be sanded to the proper angle. One way to achieve success is to prop up your wing panel so that the root rib is at the edge of your workbench and the wing panel is tilted upwards at 1/2 the desired dihedral. Then, with a large sanding block, preferably one longer than the chord of the wing, sand the rib into alignment with the edge of your bench.

If there's one piece of advice worth adding here, it's that sanding should be approached in a slow and deliberate manner. Most of all, view it as part of the fun, and you'll produce better joints. LM

## GET PUBLISHED

I was intrigued by your solicitation of "how to" articles in the last issue of Model Airplane News, but I've never written anything for a magazine before. I've been building model airplanes for more years than I'd like to admit, though, and this old dog does have a few building tricks that might interest other modelers. Just how do I go about getting published?

M. BRUEN  
Via email

Seeing your name in print is easier than you might think. Just submit clear, uncluttered photos (B&W is preferred, but color is OK), negatives and captions that illustrate and explain your technique to Model Airplane News, 100 E. Ridge, Ridgefield, CT 06877. (Be sure to include your telephone number or email address.) I look forward to hearing from you!

DS ✦



# Pilot PROJECTS

## A LOOK AT WHAT OUR READERS ARE DOING

### SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1997. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to:  
Pilot Projects, Model Airplane News, 100 East Ridge,  
Ridgely, CT 06877-4606.



### WIDOW IN OLIVE DRAB

Marty Young of Oklahoma City, OK, used Testors Model Masters paint to dress his P-61A in the scheme of the 6th Night Fighter Squadron from Saipan. Marty built the model from Nick Zirola plans and an Aeroplane Works kit; he powers it with two Brison 3.2 engines. The 50-pound plane has a 114-inch wingspan and features Robart retracts, Glennis brakes, Hangar 9 pilot figures, Aero FX nose art and TAGS stars, bars and lettering.

### NOT FOR SALE

The first model Skip Pothier of Port Perry, Ontario, Canada, built from plans, this design was featured in the May '93 issue of *Model Airplane News*. Skip

hopes to use this model to further his aerobatic flying abilities, and he says that the model's paint scheme was inspired by that of an airshow PT-17.



### FIRST WINGS

Frank Clements Jr. of LaGrange, KY, sent this photo of Josh, his 5-year-old son and flying buddy, and Josh's free-flight foam Sky Rider. Josh has a blast at the flying field playing with his inexpensive, toy-store model, and the other flyers at the field even get in on the fun and toss the model around between flights. Sounds as if this young pilot is off to a good start!



### FIGHTIN' BIPE

William Greathouse of Gettysburg, PA, designed and built this Grumman F3F-2 from photos and a 3-view. He says that when the Navy built the F3F-2 in the 1930s, he was 10 years old, and he built small,

rubber-powered models of it then. William recently decided to build an R/C version, which is powered by an ASP .75 engine, has a 52-inch wingspan and weighs 9½ pounds.



### SMALL AND QUICK

These 1/4A pylon racers were designed and built by Denis VanOrman of Altoona, PA. Each

model has a 20-inch wingspan, weighs 8½ ounces and uses a Cox TD .020 engine. Denis uses a tiny Hitec "shredder" receiver and HS-60 supermicroservos along with an Old World Engines 27MHz transmitter from the '70s. Denis says that he has been building small and micro model airplanes for the past 36 years.





## GOOFY WITH WINGS

John Lim of Torrance, CA, built this Model Tech Dragon Lady 60 and used MonoKote to create its Navy SNJ paint scheme. A SuperTigre G90 spinning a 14x6 prop keeps the plane airborne and, with pilot Goofy at the controls, John says that it's "stable and docile ... does nice scale flybys and crawls in for three-point landings." Goofy is a Johnson & Johnson® bubble-bath bottle cap that's detailed with Testors paint.

## MISTER MULLIGAN

Dixie Cutrone of Merritt Isle, FL, sent this photo of himself with his Ikon N'West Mister Mulligan taken at R/C World in Florida. The 31-pound model has a 95-inch wingspan and is powered by a 9-cylinder Seidel engine with a McDaniel glow driver.



## NORTHROP FLYING WING

Dan Ellsweig of Campbell Hall, NY, designed and built this single-engine version of the Northrop N-9M twin. The 102-inch-span model weighs 15 pounds and uses a G23 for power. Its construction is all plywood and balsa with a silkspan and dope finish. Dan scanned in the airfoil using Northrop engineering drawings and says that the clamshells on the model provide yaw control by dragging the inside wingtip in a turn. Dan's 10-year-old daughter, Katherine, holds the model.



## BRAND-NEW ANTIQUE

This Dennyplane Jr. is the handiwork of Carlton Molesworth of Mt. Vernon, WA. He says that when the kit came out in 1936, "I could neither use my skills to build such a model nor could I afford the \$25 it cost." Carlton came across the antique kit last fall and spent the winter putting it together. He says that it flies beautifully. The model is covered with Super MonoKote and is powered by an O.S. FP.25 engine.



## SCRATCH-BUILT ISLANDER

Gary Whitehead of Livingston, NJ, built this Britten-Norman BN-2A from the Mark Frankel plans that were featured in the September '73 *Model Airplane News*. Gary covered the model with MonoKote and powers it with two O.S. FS 48 engines spinning 10x8 three-blade props. Gary flies with the Hanover Township RC Flyers in New Jersey.







by GERRY YARRISH

ONE OF MY greatest desires has been to attend a first-class jets-only event—one with a lot of model jets operating off a long, paved runway. Executed by the consummate scale modeler and promoter Frank Tiano, Florida Jets had everything for a grand and successful fan fly. As serious as jet modelers are about their hobby, so too, was Frank about his task of offering them a first-class meet. The base

of operations for all this high-speed action was Flagler County Municipal Airport, just 30 minutes from Daytona in Bunnell, FL. With a freshly paved 250x5,000-foot runway, seven flight stations and about 180 entries—including 22 turbines—my desire was fulfilled as I watched the Florida Jets Fly-In unfold.

**Top:** this great-looking A-4 Skyhawk is the work of Jose (Pepe) Travieso of Miami, FL. Built from an Air Champ Models kit, the 55-inch-span A-4 is powered by a Turbomin turbine.

**Center:** David Nicholson's Byron MiG-15 comes in for another good landing despite a stiff crosswind. Powered by a KBV .72 and a Viojett fan, the MiG performed very well.

**Bottom:** Noontime lineup of all the jets. A nice time to get up close and personal.



# Florida Jets





## Fun in the fast lane!



The event took place on a runway that was shut down just for the modelers to use. What a sight; a lifetime's worth of scale military jets and many sport jets filled the large pit area, which was several hundred feet long and about 30 feet wide with a special section set aside for the maintenance and starting of the many turbine-powered jet models. Back behind the pits, there was a grassy area set aside for modelers to set up. Tents, chairs and work tables allowed modelers to work on their jets in comfort and away from the flightline and pit area. This arrangement worked very well and kept the pit area uncongested; there was plenty of room for everyone.



Lewis Patton poses with his beautiful Century Jet Models F-4 Phantom. Powered by two K&B .100 engines and Ramtec fans, the 1/7-scale F-4 had many scale features. The Phantom included working strobe and wing lights, scale cockpit interior illuminated with LEDs, drogue chute, working wing spoilers, scale retracts and flaps.



Anthony Wiencek of Winston-Salem, NC, brings in his BVM Aggressor II for a landing. Powered by a BVM .91 engine, the model is painted with PPG paints and was autographed by NASCAR race driver Jeff Gordon.



Team Turbomin ready their big F-16 Falcon for another flight. The F-16 is a modified Phillip Avonds/Aeroloft kit with a Turbomin turbine for power.





**Tom Wood** prepares his Air Magic T-38 Talon for another sortie. The T-38 is a well-engineered kit and comes ready for a BVM power system.

### FLIGHT OPS

The mission of the day for all these happy jet jocks was to have fun and to strut their stuff. The scale competitor as well as the sport flyer each had an opportunity to let it all hang out, and many did just that. Pilots came from all over the U.S., as well

as Germany, Japan, England, Puerto Rico, Argentina, Norway, Venezuela and Belgium. In the four days of the event, there were over 550 flights posted! Now that's a busy airport!

If you were interested in learning more about jet models in general, many jet manufacturers were at Florida Jets. Frank made sure that everyone knew who was flying what, and the PA system was in constant use. As each pilot took off, Bernie Oldenburgh announced who the

pilot was and something about his aircraft. The flightline staff kept pilots well-informed, and all take-offs and landings were well-orchestrated. And just to give the pilots a little bit of incentive to put in their flights, assorted prizes and cash were awarded for the 50th, 100th, 200th and so on flights. Dave Malchione flying his BVM F-4 Phantom won \$100 for flying the 500th flight!

### THE JET SET

Florida Jets was also a great opportunity to get close to practically



**Frank Tiano** took time out from his duties as organizer and flew this beautiful F-86 Sabre Jet built from a BVM kit.



**Joe Lupton** of Newport News, VA did a beautiful job of building this Jet Hangar Hobbies F-86 Sabre Jet. Powered by an O.S. .77 and a Dynamax fan, the Sabre Jet used an Ace R/C MicroPro 8000 radio for control.

every type of jet available today.

Bob Violet Models was on hand

with many BVM flyers, including World Jet Masters Champion Garland Hamilton. Garland flew his ducted-fan-powered F-80C and Aggressor III as well as his new turbine-powered BVM Bandit. The Bandit was powered by the propane fueled JPX T260 turbine while his other models got their power from BVM .91R engines. Bob's daughter, Patty Generali, also flew up a storm, putting her BVM Maverick

### Florida Jets Sponsors

#### GOLD

Airtronics  
Bob Violet Models  
Pacer Technology  
R/C Jet International  
Robert Turbomin

#### SILVER

Futaba  
JR Radios  
Leshner Model Aviation  
Mini Hobby  
ProMark  
Zone 5 Aircraft

#### BRONZE

Century Jet Models  
Rom-Air  
Spring Air  
Sullivan

### WINNERS

Award	Modeler	Aircraft
Designer Achievement	M. Kulczyk	Yak 15
Engineering Excellence	Chris Slider	Harrier
Manufacturer Achievement	Bob Violet	BVM P-80
Best Sport Jet Performance, ducted-fan	Bernard Guerette	Panther
Best Sport Jet Performance, turbine	Garland Hamilton	BVM Bandit
Best Military Performance, ducted-fan	Vern Montgomery	BVM F-4 Phantom
Best Military Performance, turbine	Joe Pasztor	JHH F9F Cougar
Best Military Jet, Pre-1960	P. G. Stromman	FiberClassics F-86
Best Military Jet, Post-1960	Eric Ramtet	Aviation Design Mirage 2000
Best Civilian Jet	Kerry Sterner	Rutan Ares
Best Sport Jet	Pat McCurry	BVM Maverick
Best Multi Engine Performance	Jack Diaz	BVM F-4 Phantom
Critics Choice, ducted-fan	Jack Diaz	BVM F-4 Phantom
Critics Choice, turbine	Takashi Komuro	JMP T-33 Thunderbird

through some flights that were best described as smooth.

Tom Cook of Jet Model Products was there, and his T-33 Thunderbirds were very popular entries, including one built and flown by Top Gun competitor Jeff Foley. JMP



also showed the new AMT turbine, which includes many interesting features. It's equipped with a throttle-monitoring system that optimizes fuel-flow delivery to the engine. This system regulates the fuel so that no matter how fast you advance the throttle, there's no chance of a flameout. The system also includes monitoring of the exhaust-gas temperature and engine rpm and shuts down the turbine, preventing damage if anything goes wrong.

Century Jet Models was also on hand and showed off their Heinkel He-162 Salamander as well as their brand-new Republic F-105 Thunderchief. Both are unusual and interesting designs for the modeler wanting something a little different. On the flightline, Lewis Patton of



Louisville, KY, flew his beautifully executed CJM F-4 Phantom done up in U.S. Marine colors. Powered by two K&B .100 engines turning Ramtec fans, Lewis's F-4 included working lights, a fuel-pump system, a working drogue chute and a fully

**In for another successful landing, Pat McCurry's BVM Maverick gently settles in. Power comes from a BVM .91S.**



**Above: Clark Hopkins of Miami, FL, brought his BVM T-33. The BVM .915-powered T-Bird is finished in Presto and paint.**

**Left: never one to be on the ground for long, Bob Violett put on quite a show with his JPX T-260 turbine-powered F-80 Shooting Star.**



## Replacement Parts Made Easy

**W**hat do you do? You've traveled a long way to a fan rally and after only a couple of flights you damage your model. There are three more days of flying left, and you can't really fix it properly at the field. This was the situation for Dave Malchione and his beautiful Bob Violett Models F-4 Phantom. Dave just went to the BVM tent and got a wing panel from another kit. In a matter of hours, Dave was back on the flightline ready to fly: the weekend was saved.

This illustrates the high level of quality control BVM put into their products. The new wing panel slid right into place, and all the hardware Dave removed from his damaged wing panel slipped right into the replacement with very little, if any, modification. We've seen the

same type of interchangeability of BVM parts when, at this year's Top Gun Scale Invitational, Jack Diaz lost an engine-compartment hatch cover from his BVM F-4. To finish the rest of his flights, Jack simply replaced the cover with one taken from his backup F-4. Another perfect fit!

**All set up with a new wing panel, Dave Malchione's BVM F-4 is ready for another flight.**



## JET TYPES

### Scale Jets

T-33 Thunderbird.....	17
F-15 Eagle .....	15
F-86 Sabre Jet .....	13
F-4 Phantom .....	12
F-16 Falcon .....	11
F-18 Hornet .....	9
F-20 .....	4
F-3J Sea Fury .....	4
Rafale.....	3
P-80 Shooting Star .....	3
MiG 15 .....	3
A-4 Skyhawk .....	3
F-117 .....	2
Hawk .....	2
Caproni C22J.....	2
Rutan Ares.....	1
F9F Cougar .....	1
T-38 .....	1
F-5B.....	1
MiG 29 .....	1
Harrier .....	1
F-104 .....	1
Mirage 2000.....	1
RA5C Vigilante.....	1
F-100 .....	1

### Sport Jets

Maverick .....	13
Aggressor II/III .....	12
Viper.....	6
Cyclone .....	6
Bandit .....	5
Maverick Pro .....	4
Ultra Viper .....	4
StarFire .....	3
Vortex .....	3
StarJet.....	2



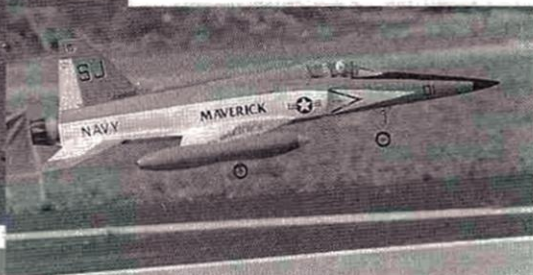
**Joe Pasztor won the Best Military Performance, Turbine Award with this Jet Hangar Hobbies F9F Cougar. Powered by the Golden West turbine, the Cougar weighed in at 12 pounds—many impressive flights.**



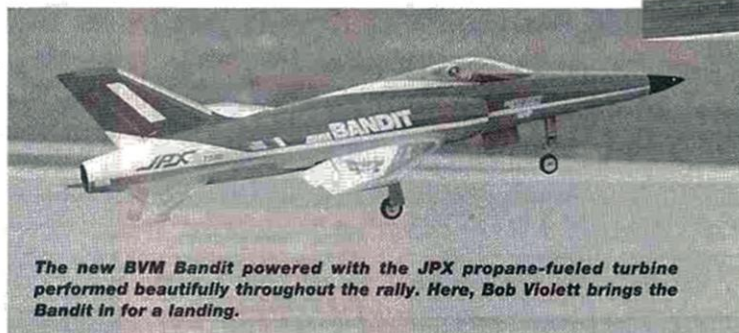
## FLORIDA JETS



*Mavericks to the left of me, Vipers to the right; Bob Violett Models accounted for the majority of the models at Florida Jets.*



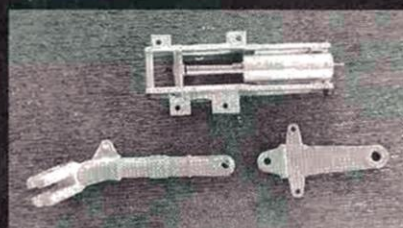
*A great jet to get you started, the BVM Maverick is a very popular first choice.*



*The new BVM Bandit powered with the JPX propane-fueled turbine performed beautifully throughout the rally. Here, Bob Violett brings the Bandit in for a landing.*

modified hair dryer spooled up the turbine. This, coupled with LED status indicators on its handheld ground-support unit, seems to offer a very uncomplicated start-up sequence.

New manufacturers in the jet set (new to me, anyway) were Air



*Dave Ribbe produced these custom-made plastic masters for his 1/6-scale MiG-15 landing-gear struts using Laser Stereo Lithography. Literally grown in a vat of liquid plastic, the masters will be used in a lost-wax technique to produce metal parts. Dave also custom-made the retract mechanism.*



## CUSTOM-GROWN PARTS?

One item we saw at Florida Jets was a really interesting set of retractable landing gear made by scale competitor Dave Ribbe. When we caught up with Dave, we asked him how he made such unusual and obviously difficult to machine parts. Here's what we learned.

Dave is a design engineer for a major toy company and has access to some very high-tech equipment used in the design and manufacture of plastic toys. With the help of CAD programs and 3D computer modeling, many toy companies use a process called "rapid prototyping" to make masters for the molds of parts to be produced. Dave used this same technology to produce the master for his 1/6-scale MiG-15 landing gear. In a nutshell, here's how it's done.

Dave first creates a 3-view CAD drawing of the parts. Once the drawings are finished, he loads the file into a computer running a very high-quality 3D modeling program where he virtually assembles the parts. Here, he checks the parts' fit and movement. Parameters such as fit tolerances and corner fillet radii can be easily adjusted until the parts fit and operate perfectly. When everything is working in the 3-D program, he then converts each part into a digital file and sends it to a Laser Stereo Lithography (LSL) machine, which then begins to make the parts.

LSL is as close to a Star Trek "replicator" as we have today because LSL literally grows parts from a vat of liquid plastic. Starting with the vat of laser-sensitive material, a laser beam begins to "draw" the part in three dimensions, one cross-section at a time. As the laser hits the liquid plastic, the plastic polymerizes and a solid, plastic structure is formed within the liquid. The process typically takes about eight hours to "grow" a part like Dave's gear strut. Start the process before you leave for the night, and when you return in the morning, the part is waiting for you.

With master plastic part in hand, it can now be used in a "lost wax" method to produce metal parts. Rapid prototyping has to be one of the greatest developments in manufacturing technology and it is already being used to help modelers build scale aircraft. Aren't modelers clever?!



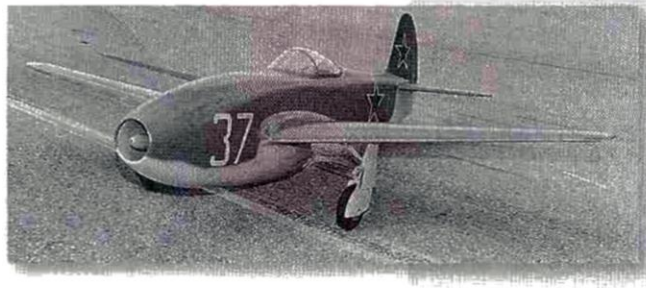


A close-up of Vernon Montgomery's F-4, nicely detailed. Vern won the Best Military Performance Ducted-Fan award with his Phantom.

Champ Models Inc. and Air Magic Mfg. Air Magic had two of the nicest looking kits I've seen for the T-38 Talon and the F-5B. Both had gelcoated parts made of epoxy/glass and both come ready for the VioJett power system. The Talon is one of my favorite aircraft and the Air Magic kit almost had me reaching for my wallet. Air Champ Models showed off their F-15D Eagle, their F-18 Hornet and an A-4 Skyhawk. Their F-15D (dual-cockpit version) was set up for the Turbomin turbine engine and is built of epoxy/glass and honeycomb construction. Their F-18 Hornet comes with all flying surfaces built and spars installed and is advertised as "Almost Ready to Fly"! These jets come with a high degree of prefabrication and all the kits come finished in epoxy primer and with panel line detail already done—pretty impressive!

With over 180 model jets entered—all of which were first-class; it's impossible for me to

**OK, you want something different? How's this, Designer Achievement award winner M. Kulczyk's Yak 15. Yea, it's scratch-built.**



describe them all here. Let's just say there was never a time when the sky wasn't full of jets—as many as six at a time. One very important thing I noticed was how quiet the models were. This and the across-the-board improvements in reliability draw a sharp contrast to the image that many non-jet modelers have of the whole jet model picture. If ever there was a time for you to consider building and flying ducted-fan jets, it's now.

For more information of the next Florida Jets event, contact Frank Tiano at FTE, 15300 Estancia Ln., West Palm Beach, FL 33414; (561) 795-6600. ✈



Room to spread out: the pit area was huge and always filled with jets.

## ROUNDUP OF REGISTERED MODELS

Aircraft Type	Aviation Design	Airtronics	Parkinson
Bob Violett Models .....73	Top Gun .....3	Hitec .....4	Turbax.....1
Byron Originals .....13	Zone 5 Aircraft .....3	Graupner .....3	<b>Fuel</b>
Yellow Aircraft.....13	Century Jet Models .....2	Multiplex .....1	Wildcat .....51
Scratch-built .....12	Air Magic.....2	Ace R/C .....1	BVM .....13
Jet Model Products .....8	Bob Parkinson.....2	<b>Engines</b>	Byron .....10
Phillip Avonds .....8	J.D. Model Products .....2	BVM .....63	Powermaster.....8
Jet Hangar Hobbies.....7	FiberClassics .....1	O.S. ....56	Fiorenze.....8
DL Aeromodelers .....6	<b>Turbines</b>	K&B.....16	Morgan .....6
	Turbomin .....10	Rossl.....4	Sig .....5
	JPX .....7	Nelson.....2	JBK .....4
	ATM .....3	<b>Fans</b>	Ritches Brew .....4
	Golden West .....2	BVM .....67	K&B.....3
	<b>Radios</b>	Dynamax .....37	Jet-A .....2
	JR .....73	Ramtec .....12	Magnum .....2
	Futaba .....64	ByroJet .....10	

These figures are for unofficial comparisons only. Some pilots did not supply complete information on their models.



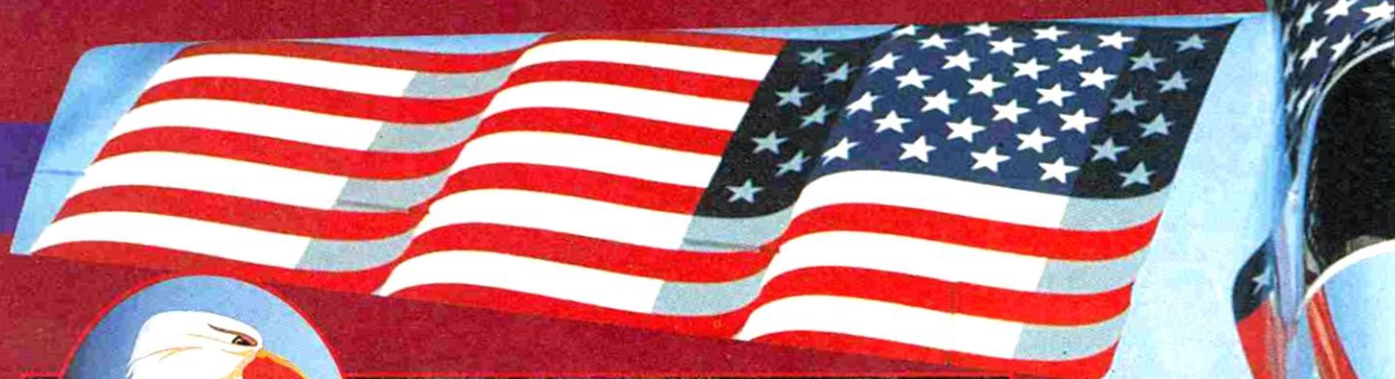
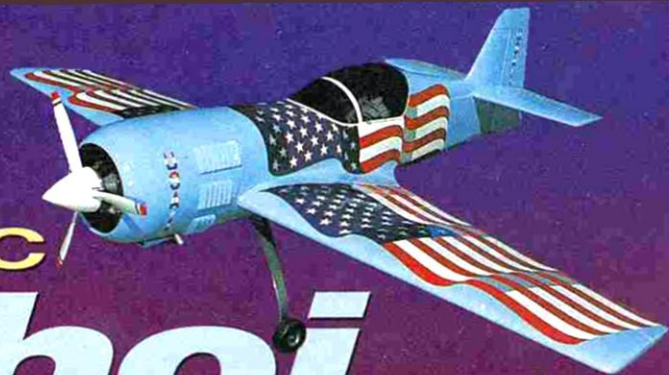
# READERS' GALLERY

by GERRY YARRISH

## A PATRIOTIC *Sukhoi* IN MONOKOTE

**P**ATRIOTISM COMES to mind when viewing this beautiful Sukhoi Su-26mx. But would you believe it's completely finished in MonoKote? Eighteen colors of MonoKote, to be exact. Who's the builder of this red, white and blue Sukhoi? Why, none other than that MonoKote madman himself, Faye Stilley.

Faye has been perfecting his skills in using MonoKote for many years, and what he can do with this thin, plastic material is truly amazing. The proof of his skill is shown in the fact that at the



A patriotic Sukhoi all dressed up in MonoKote. Eighteen colors of MonoKote were used to finish the model.



So the model would not disappear while in flight, Faye dressed up the belly with a beautiful eagle design. The idea came from the back of a quarter. Just try to count the individual pieces of MonoKote used in the eagle alone. Then the shield, and then the arrows and the olive branch....





Toledo Weak Signals' trade show, he has won first place in the MonoKote Finishing class every year he has entered (a total of seven times). It would be no stretch of the imagination to say that Faye has written the book on covering with MonoKote; in fact, he has written two.

Faye's Sukhoi is as pleasing a sight as any custom-painted show plane. Up close, however, where you can see each and every seam and how closely every piece of MonoKote meets with the next, you realize the amount of work involved in Faye's mosaic.

Faye chose the waving-flag motif because it was an election year, and every political commercial he saw bombarded him with patriotic images of American flags. It just seemed natural. The eagle on the belly, however, came after Faye realized that a light-blue plane would most likely disappear while airborne, given the correct lighting conditions. Just look



at the back of a quarter to see where Faye got the idea for the feathered pattern. But the truly amazing thing about Faye is that after he creates his magnificent models, he actually goes out to the flying field and commits aviation with them. Faye takes great pride in telling everyone that he doesn't build "hangar queens"—sorta makes you question Faye's sanity. It's madmen like Faye who make our hobby so rich. †



The model also features a beautifully detailed instrument panel and a functional canopy latch.



Most of the radio equipment is positioned in the tail under a hatch, just in front of the tailwheel. The scale tailwheel was also scratch-built by Faye.

## SPECIFICATIONS

**Model:** Ohio R/C  
28% Sukhoi  
Su-26mx

**Wingspan:** 84 in.

**Wing area:** 1,660 sq. in.

**Weight:** 17 lb.

**Engine:** O.S. Gemini  
300T 4-stroke

**Exhaust sytem:** Air  
Hobbies smoke/mount  
muffler

**Prop:** 3-blade 18x10  
Zinger

**Radio:** Futaba

**Finish:** entirely  
MonoKote (18 colors)

**Time to build:** 6 months

**Comments:** Faye Stilley has brought covering model airplanes with MonoKote to an art form and has won the Toledo trade show's MonoKote Finishing class every year he has entered (seven times). Faye also flies all of his models and takes pride in saying he does not build "hangar queens."





# Hints & KINKS

by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON

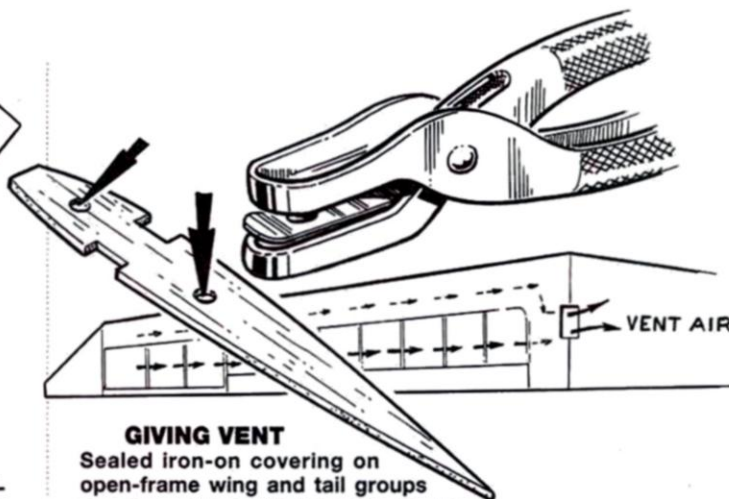
EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



## DESIGNER SPREADERS

Ask for out-of-date sample Formica chips or similar laminated plastic at a remodeling store. Not only are the chips excellent spreaders for glue but, wiped clean with acetone, they are excellent raw material for special bellcranks, control horns, hinge brackets, etc.

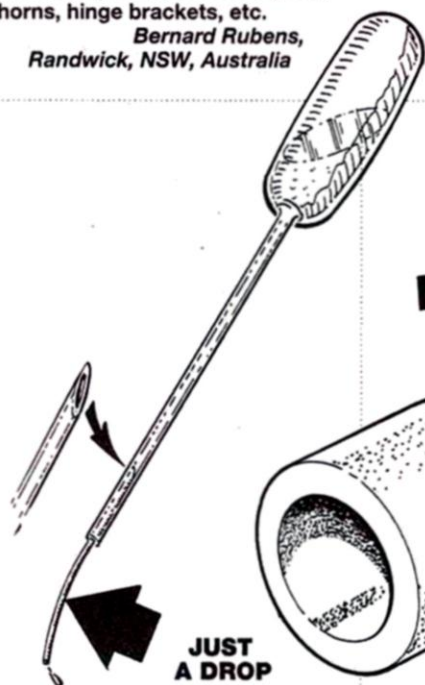
Bernard Rubens,  
Randwick, NSW, Australia



## GIVING VENT

Sealed iron-on covering on open-frame wing and tail groups can expand and "balloon" in the hot sun and at high altitudes; this has been known to distort and damage the model's structure. To prevent this, perforate each rib so expanding air can vent into the fuselage and exit via pushrod holes, etc. A paper punch makes a neater hole than a drill.

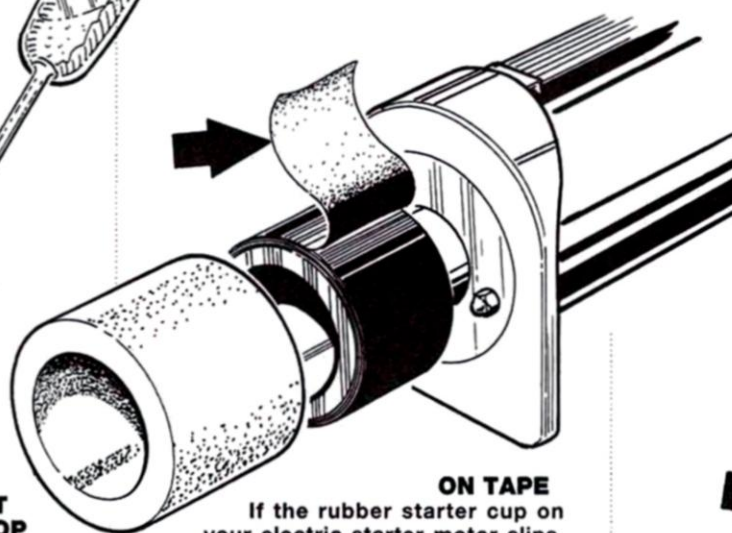
Joe Beckner, Ukiah, CA



## JUST A DROP

To further restrict the flow from those plastic squeeze-bulb CA dispensers, push a short length of small-bore plastic tubing (usually supplied with the bottle of CA) into the end. To help insert it, cut the end of the tube at an acute angle.

Bob Hansen, Muskegon, MI



## ON TAPE

If the rubber starter cup on your electric starter motor slips, wrap layers of black vinyl tape around the metal hub until the cup is a tight fit.

Tim Luttrell, Sarasota, FL



## DRIBBLE HOW-TO

Tie a short length of nylon monofilament fishing line to the tip of a CA bottle. The droplets will dribble down the filament into those hard-to-reach spots.

Lee Laster,  
Porriya, Israel





MODEL  
AIRPLANE  
NEWS

## FIELD & BENCH REVIEW

ALTECH  
MARKETING

# PILATUS TURBO PORTER



*Slow-flyin',  
sport-scale ARF*

PHOTOS BY GERRY YARRISH

by CRAIG TRACHTEN

If you have a lot of building experience but little time to apply it, the Altech\* Pilatus Turbo Porter PC-6 ARF is the kit for you. The fuselage and wings of this short-takeoff and landing (STOL) model are built and covered, but you still get an opportunity to employ your building talent; this kit gave my construction experience a run for its money! I am glad to be the owner of a Porter; the result—and all those oohs and aahs at the field!—were well worth the effort.

This kit is not for beginners. The instruction manual assumes that you have a lot of kit-building knowledge, and I only used the manual for assembly sequence, technical specs for control surface movement and CG location. Freshmen, exercise caution; experienced builders, go for it!



## WING AND FUSELAGE CONSTRUCTION

The wing halves must be epoxied together the same way as most ARFs. Before starting assembly, mark and cut each wing half for the aileron servo opening, and test-fit the dihedral brace for proper fit and angle. Epoxy in the brace, and epoxy the wing halves together. After the epoxy has dried, reinforce the seam with the supplied fiberglass cloth. I epoxied two hardwood blocks to the wing for a servo mount. The aileron hinge slots were pre-cut but did not line up; mark and cut your own hinge slots. It isn't mentioned in the instruction manual, but a top plate is provided to cover the seam and to give the wing a nice, finished look. Attach the plate with CA gel. After it has dried, mark and drill the holes for the wing bolts, then attach the wing to the fuselage. Using the holes in the forward bulkhead as a guide, drill the holes for the forward wing dowels.

My standard operating procedure is to CA every joint and bulkhead I can reach; I'd rather be safe than sorry. This isn't a reflection on the construction of the Porter (or any other ARF), it's just what I do. I also epoxy in a 1/4-inch piece of lite-ply to back up the existing firewall.

The supplied wood servo tray is mounted in front of the rear bulkhead and under the rear hatch. The supplied servo mounting rails were too short, so I epoxied in two hardwood rails to each side wall and mounted the tray on them. Make sure the rails are high enough to prevent the servos from bottoming out. To install the motor mount, I first drew a line across the firewall at the bottom of the top deck radius. I then centered the mount right to left. Using the mount as a guide, I marked and drilled the mounting holes. I used an Ernst\* no. 122 Super Mount. After installing the mount, I epoxied on the four cowl-mounting blocks.

## SPECIFICATIONS

**Model:** Pilatus Turbo Porter PC-6

**Type:** sport-scale ARF

**Manufacturer:** Altech Marketing

**Wingspan:** 72 in.

**Wing area:** 720 sq. in.

**Weight:** 9 lb.

**Wing loading:** 28.8 oz./sq. ft.

**Length:** 54 in.

**Engine req'd:** .40 to .60 2-stroke or .53 to .80 4-stroke

**Engine used:** Enya 80-4C 4-stroke

**Radio req'd:** 4-channel (rudder, aileron, elevator and throttle)

**List price:** \$364.98

**Features:** built and covered fuselage and wings; form-fitting windows and supplied struts that add to the scale look.

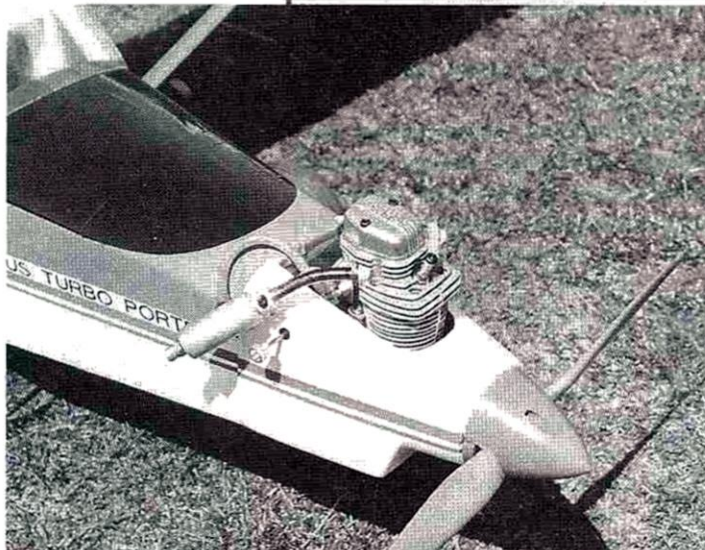
**Comments:** this kit is not for first-time or beginner modelers, but if you have building experience, you'll end up with a good-looking, good-flying aircraft that will generate a lot of interest at the field.

### Hits

- Takes little time to build.
- Good flight characteristics.
- Looks pretty.

### Misses

- The construction manual assumes too much building knowledge for an ARF model.



An Enya 80 4-stroke engine is a perfect match for the Porter, and with the Enya in its nose, the model's CG was right on.

so nice and tight that I didn't need to install the two side straps; besides, I liked the way it looked without them. I applied a few drops of CA gel in the side holes, and that worked well. Sullivan\* 4-inch Skylite wheels with Sullivan wheel covers capped off the fuselage construction.

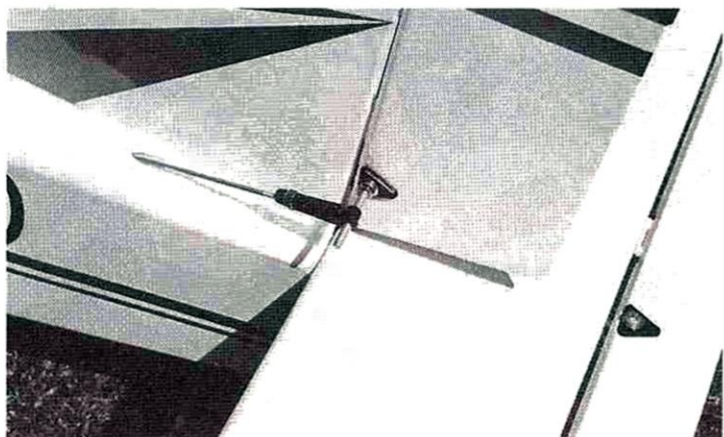
## ENGINE AND RADIO INSTALLATION

Because I'm a 4-stroke junkie, I decided to power the Porter with an Enya\* 80-4C engine. During its first break-in start, it fired up so fast that I jumped. A nice "give me" with this engine is a remote Ni-starter system. Before you install the engine, open the front of the cowl and cut an opening for the head and muffler. Place your engine on the mounting rails and mark where the throttle pushrod will come through. Attach the cowl and adjust your engine so the

I installed a 16-ounce Du-Bro\* tank. I turned the fuselage over so the tank rested under the top deck of the aircraft and then stuffed a foam block under the tank to hold it in place. When you turn the fuselage right-side up, check to make sure that the fuel tank is also right-side up.

Install the pre-made landing-gear wire using the included metal straps. The fit was

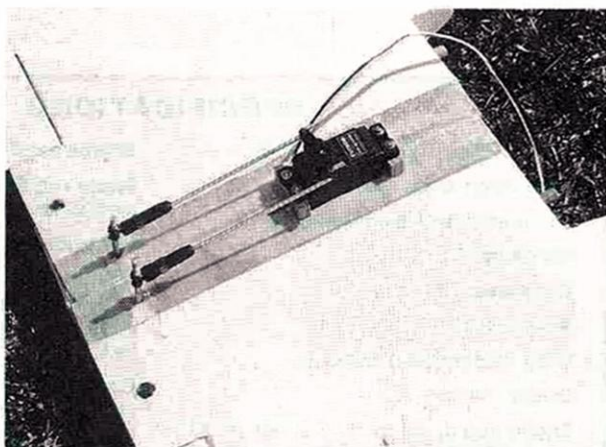
The tail linkage is simple and easy to install.





## ALTECH MARKETING PILATUS TURBO PORTER

thrust washer is  $\frac{1}{8}$  inch in front of the cowl. Mark the engine-mounting holes on the rails, and mark the cowl for the needle valve, choke and any other adjustment holes you might need. Remove the cowl and drill engine mounting holes in the rails and holes in the cowl as needed. Before you mount the engine, be sure to make the Z-bend on the throttle pushrod and attach it to the throttle lever. Feed the pushrod through the hole in the firewall as you move the engine into place. I installed a piece of plastic pushrod guide (left over from another kit) through the firewall and braced it to a bulkhead before I mounted my engine. A Du-Bro  $2\frac{1}{4}$ -inch red spinner capped off the engine installation. (The instructions

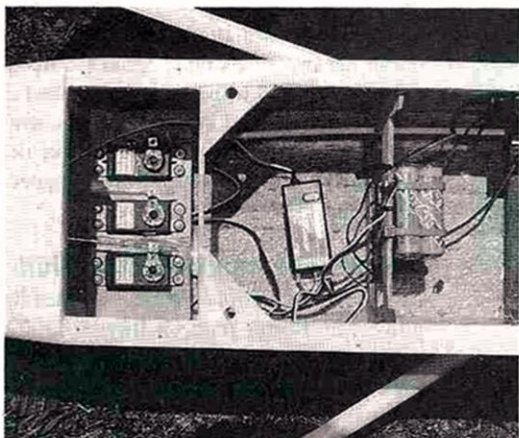


The wing seam is reinforced with fiberglass cloth (supplied in the kit), and the aileron servo is mounted on two hardwood blocks epoxied to the wing.

called for a 2-inch spinner, but I opted for a  $2\frac{1}{4}$ -inch one.)

This kit doesn't have an interior, and I thought that looking through the windshield to see the bowels of the aircraft detracted from the model's pretty appearance. I cut two pieces of  $\frac{3}{16}$ -inch balsa to provide a back wall and floor for the cockpit, and a Flash Gordon character volunteered to be my test pilot.

I used my Futaba® 8UAF radio with four standard S148 servos. Any quality 4-channel radio and servos would work well in this aircraft. The aileron servo was mounted on the wing; the other three were mounted in the servo tray. The receiver was mounted just in front of the servo tray with heavy-duty locking-ball mounting material from Radio Shack. I stuffed the receiver battery as far forward as possible, under the interior floor I installed earlier. Between the receiver and battery,



The Futaba S148 rudder, throttle and elevator servos are mounted in the supplied tray, and the receiver stays put with the use of heavy-duty locking-ball mounting material from Radio Shack.



Author Craig Trachten preps the Pilatus Turbo Porter for its first test flight.

## FLIGHT PERFORMANCE

### • Takeoff and landing

Takeoff was as easy and uneventful as any I have experienced. The model was rock-steady—even flying into a stiff headwind. At  $\frac{1}{2}$  throttle, I was airborne in about 20 feet. The only trim needed was a few clicks of down-elevator for straight and level flight. Landing was a bit trickier. I took off cross-field into the wind. Landing, I had to follow the traffic pattern, which forced me to land with a stiff cross-wind. There was enough rudder and aileron authority to handle the less-than-perfect landing conditions. I greased the landing! I will mention that the 13x6 prop did not leave enough ground clearance, and I bopped the prop on landing. Bending back the tailwheel wire and going from 4- to 5-inch Skylite wheels remedied the problem.



### • Low/high-speed performance

This aircraft was extremely stable despite the wind, and recovery from getting blown left, right, up and down was easy and effortless. In better wind conditions, the Porter could be one of the ultimate putt-putt, touch-and-go aircraft on the market.

### • Aerobatics

Again, the wind came into play. Although the Porter isn't an aerobatic aircraft, it did loop and roll. With plenty of rudder and aileron authority, recovery was easy and responsive.

I installed a Du-Bro on/off switch with charging jack. With the Enya 80 mounted on the nose and the receiver battery as far forward as possible, the CG was right on.

## BUILDER'S THOUGHTS

As I mentioned earlier, this kit is not for beginners, but it scores high marks for structural soundness, solid flight characteristics and great looks. It's definitely a keeper and a flyer!

Addresses are listed alphabetically in the Index of Manufacturers on page 126. ★



by GUY FAWCETT

## Make Light, Scale

# WW I Wheels

Fabric-covered  
spokes in  
14 easy steps

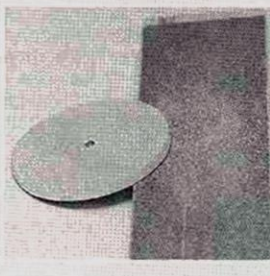
**E**ARLY AIRPLANES WERE fitted with any wheels that could be scrounged and put to a use not usually intended by the manufacturer. Then, during WW I, the Palmer Aero Cord Co. was a major innovator of aircraft wheel production. Palmer became a major supplier of British aircraft manufacturers and their subsidiaries, and the company's large, white logo is featured prominently in many photographs of airplanes from that era. Palmer used a specially designed rim and tire that could withstand a side load of 2,800 pounds and, as extra insurance, the wheel featured more spokes (64 versus the standard 40).

The spoke arrangements of WW I tires resulted in either a cone extending to one side of a centerline or cones protruding from both sides. Table 1 shows the most common sizes of Palmer tires and their equivalent sizes in 1/8 and 1/4 scale—the most popular WW I scales.

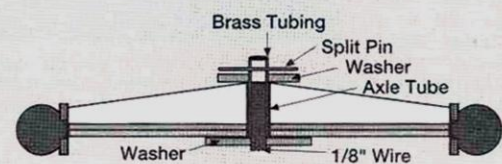
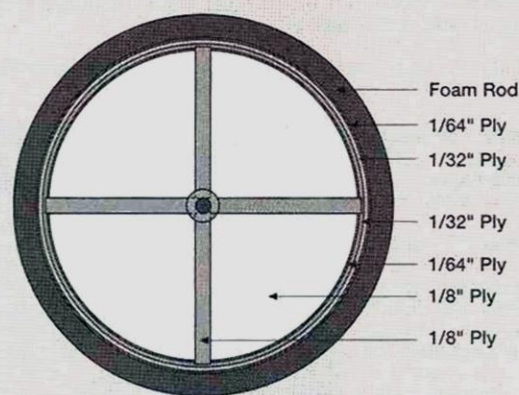


Very light, scale-looking, WW I fabric-covered spoked wheels are easy to build and extremely light (a 4 5/8-inch wheel weighs only about 3/4 ounce). The SE5 that I'm working on requires a set of 1/8-scale Palmer Cord 700x100mm wheels. Using Table 1, that equates to a 4 5/8-inch-diameter wheel, a 5/8-inch-diameter rubber tire and a 1 5/32-inch-wide hub.

**1** Using a compass, draw two circles on 1/8-inch lily-plate that equal the inside diameter of the rubber tire as determined from the chart. In my case, the circles will need to be 3 3/8 inches in diameter ( $4 5/8 - [2/8 + 2/8] = 3 3/8$ ). Cut the disks out, but don't cut too close to the line. Drill a 1/16-inch hole through the disks at the center mark left by the compass. Secure the disks together with a wood screw. The compass lines should be on the outside of both disks. Now carefully sand down to the lines, checking both sides to ensure the edge is at 90 degrees to the face.

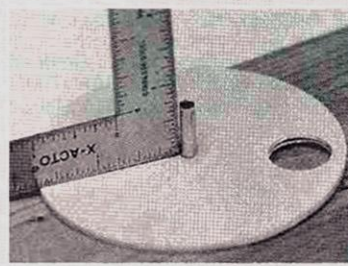


**2** Enlarge the center holes enough to accommodate a brass tube, which will slide over the axle tube on your aircraft. I find it best to clamp the two disks together, and then remove the screw and drill with the larger bit, using the smaller hole as a pilot.

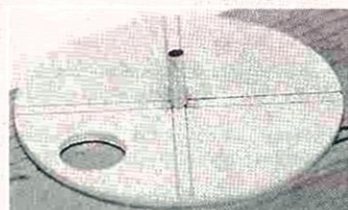


**3** For a 1/8-scale WW I fighter, 1/8-inch-diameter music wire makes a good axle that is then fitted with end pieces of 1/8-inch-i.d., 5/32-inch-o.d. brass tube. This requires an axle tube with a 3/16-inch-o.d. in the wheel itself. At this time I also drill a 3/4-inch hole toward the edge of the disk to accommodate a tire valve (leave about 1/8 inch between the hole and the edge of the disk).

**4** Now measure and cut two lengths of the brass axle tube. In my project, these tubes are 1 inch long and stick out 1/4 inch on the outside of the disks; however, this will vary according to scale and tire type. To create a better surface for the glue to grip, roughen the exterior of each tube with 80-grit sandpaper until it shines. Align the brass tube at 90 degrees to the ply disk and, depending on the spoke arrangement, allow the tube to extend the proper distance on each side. Glue the tube to the disk using epoxy or thick CA and use a square to ensure proper alignment.







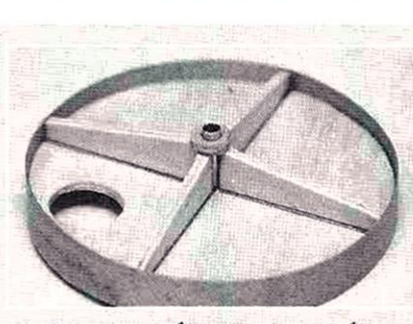
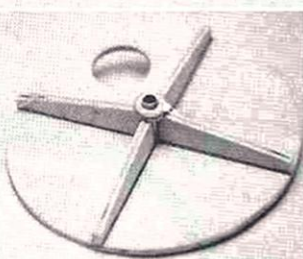
**5** Using the tube as a guide, draw reference lines 90 degrees to each other.



**6** Cut two, 1-inch-diameter disks out of 1/8-inch lite-ply, and drill a hole in each that's the size of the tube that's already glued to the larger disk. Slide a disk onto each inside wheel face, and glue them into place.

**7** Cut eight triangles (four for each wheel) out of 1/8-inch lite-ply to support the axle tubes. Glue them into place without changing the tube's alignment. The end of the triangle that will touch the rim (which will be added in step 8) should be 1/16 inch lower than the top of the rim. The end of the triangle that touches the brass axle tube should be 1/4 inch lower with its top corner sheared off to provide an 1/8-inch-wide ledge. Make sure the triangles protrude beyond the edge of the disk slightly, and then sand them flush with the disk.

Draw two 3/8-inch-diameter circles on 1/8-inch lite-ply, and in the center of each, drill a hole that's the size of the axle tube. Cut around the disks and sand down to the lines. (Because these pieces are so small, it's easier to drill the holes before you cut them out.) Glue the disks to the top of the triangular sections, leaving 1/8 inch of the brass tube sticking out.



**8** Cut a strip of 1/64-inch ply that's 1/2 inch wide and equal to the circumference of the large disk in length. Draw a line 3/16 inch from the edge and use this as a guide when you glue the strip perpendicular to the outside edge of the large disk. This forms the base of the rim.

## YOU'LL NEED

- 1/8-inch lite-ply
- 1/32-inch balsa
- 1/64-inch plywood
- Spider wire (Spectre-based fishing line) if you build a Palmer Cord wheel
- Foam backer rod (sold at hardware stores in various diameters as fillers to be used before caulking is applied)
- Brass tube large enough to slide over the chosen axle wire
- Coverite or similar heat-shrink fabric

## PALMER TYRE LIMITED STANDARD SIZES\*

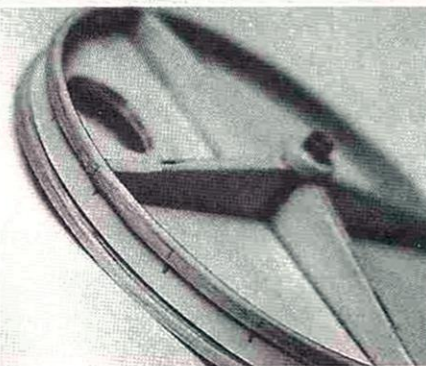
PROTOTYPE			1/6 SCALE		1/4 SCALE	
Dia. x width (mm)	Hub length (mm)	Track line	Dia. x width (in.)	Hub length (in.)	Dia. x width (in.)	Hub length (in.)
300x60	111.12	Central	2x3/8	3/4	3x5/8	1
300x16	72.39	Central	2x1/8	1/2	3x1/4	3/4
450x60	89	Central	3x3/8	9/16	4 1/16x5/8	7/8
575x60	150	Central or 104/46mm	3 3/4x3/8	1	5 5/8x5/8	1 1/2
600x75	150	Central or 104/46mm	4x1/2	1	5 7/8x3/4	1 1/2
700x75	178	132/46mm	4 5/8x1/2	1 5/32	6 7/8x3/4	1 3/4
700x100	185	Central or 135/50mm	4 5/8x5/8	1 7/32	6 7/8x1	1 7/8
700x100	178	132/46mm	4 5/8x5/8	1 5/32	6 7/8x1	1 3/4
700x100	150	Central	4 5/8x5/8	1	6 7/8x1	1 1/2
750x125	185	Central or 135/50mm	5x3/4	1 7/32	7 3/8x1 1/4	1 7/8
750x125	178	132/46mm	5x3/4	1 5/32	7 3/8x1 1/4	1 3/4
800x150	185	Central or 135/50mm	5 1/4x1	1 5/32	7 7/8x1 7/16	1 7/8
900x200	185	125/60mm	6x1 1/4	1 5/32	8 7/8x2	1 7/8

\*Other manufacturers offered similar sizes.

**9** Glue a strip of 1/32x1/8-inch balsa around the circumference of each outside rim edge. Then repeat the process until two layers are on each edge. This bulks up the edges to contain the tire. If you're building German or French wheels, skip to step 12 and continue. The 40 spokes used in German and French WW I wheels did not contact the fabric and therefore were not visible from the outside.

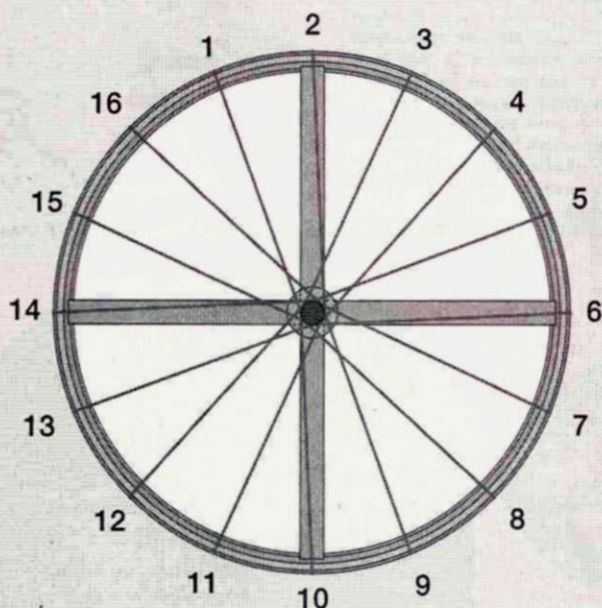


**10** Cut a piece of paper to equal the circumference of the rim and mark it off into 16 equal spaces. Although Palmer Cord tires had 64 spokes, only 16 spokes on each side of the wheel contacted the fabric covering and were visible; this is what we are going to simulate. Wrap the paper ruler around the rim and tape it into place while marking the spoke positions. On the inside edge of the rim, opposite one mark, drill a 1/16-inch hole through the 1/64-inch plywood to act as an anchor point. Pass the spider wire through this hole and make a knot large enough to prevent the line from coming back.

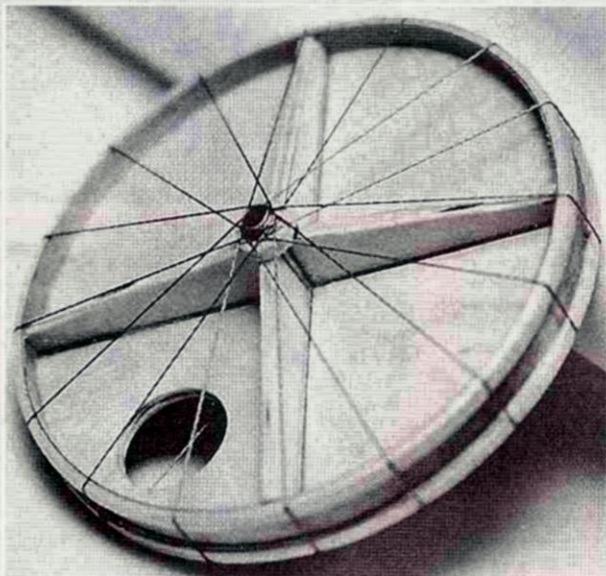
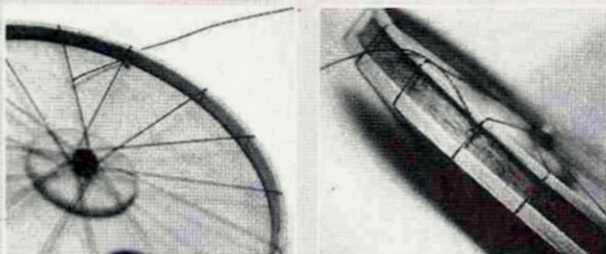




## MAKE LIGHT, SCALE WW I WHEELS

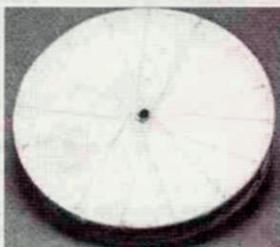
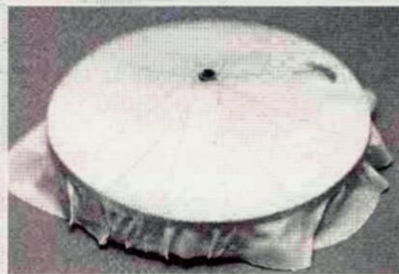


**11** Starting from position 1, take the wire to the axle tube and go around it and back to position 2. Now go across the rim to the other side of the wheel and continue to the axle tube, wrap the wire around, and bring the wire to the number 3 position. Cross the rim again and pull the line back around the axle tube on the face that you began with. From here, the process is simply repeated until the original starting point is reached. The secret is to keep tension on the line during the whole process and to press the wire down around the tube occasionally. When the wire finally comes all the way around the wheel to the starting point, tie it to the wire where it enters the rim. To prevent the wire from moving, apply thin CA at every point where the wire touches the wood or itself.



**12** Glue two strips of  $\frac{1}{4} \times \frac{1}{8}$ -inch ply around the circumference of each raised balsa edge of the rim. This hardens the edges to help contain the tire.

Now apply Balsarite\* over everything and cover the wheel with Coverite\*. Start by cutting out circles of covering about  $\frac{3}{4}$  inch larger than the wheel's diameter. Then cut a  $\frac{3}{16}$ -inch-diameter hole in the center with a piece of sharpened brass tube. Cut a  $\frac{1}{2}$ -inch hole for the tire-valve access, again using a sharpened brass tube, this time only on the covering that will form the outside face.



**13** Cut the excess covering away and let the wheel dry. It's now ready to be painted.

**14** I make the tire itself out of light gray,  $\frac{5}{8}$ -inch-diameter foam rod that's used in the building industry for insulating between bricks. The rods come in several diameters. Determine the circumference of the rod's rim, and cut the foam to this length. Make sure the cuts are square. Now shave the rod until you can connect the ends around the rim, and cut the other rod to the same length.

Glue the rod end to end with thick CA. The best method I have devised is to coat one face of the rod with the CA and the other with kicker, then bring them together. To ensure that the rod faces meet perfectly, you can use a simple jig made of a single piece of right-angle channel.

After the glue has set, remove the tire from the jig. To ensure good adhesion, you should roughen the inner surface of the tire with sandpaper before painting. Check your documentation to confirm the color of the aircraft's tire; most WW I tires were gray, and the usual color of the rod might be acceptable. If the tire should be black, paint it with liquid shoe polish; so far, it's the only pigment I've found that sticks to the rod surface. Paint on any applicable lettering (Palmer Cord Aero Tire and dimensions, etc.).

After the paint on the tire has dried, put glue around the groove in the rim (I use Weldbond) and push the tires on. Correct the tire's alignment by spinning the wheel on the axle and nudging the tire into place until it runs true.



Wheels built using this method have been used extensively on my 7 $\frac{1}{2}$ -pound SE5. The worst that has happened is that early in the testing, I ran a tire off the rim on a really hot landing. In an emergency, you can glue the tire back on the rim with thick CA. All my flights have been off a grass runway. One caution: I wouldn't advise flying off hard surfaces unless you replace the foam rod with rubber tubing (automotive heater hose or another alternative).

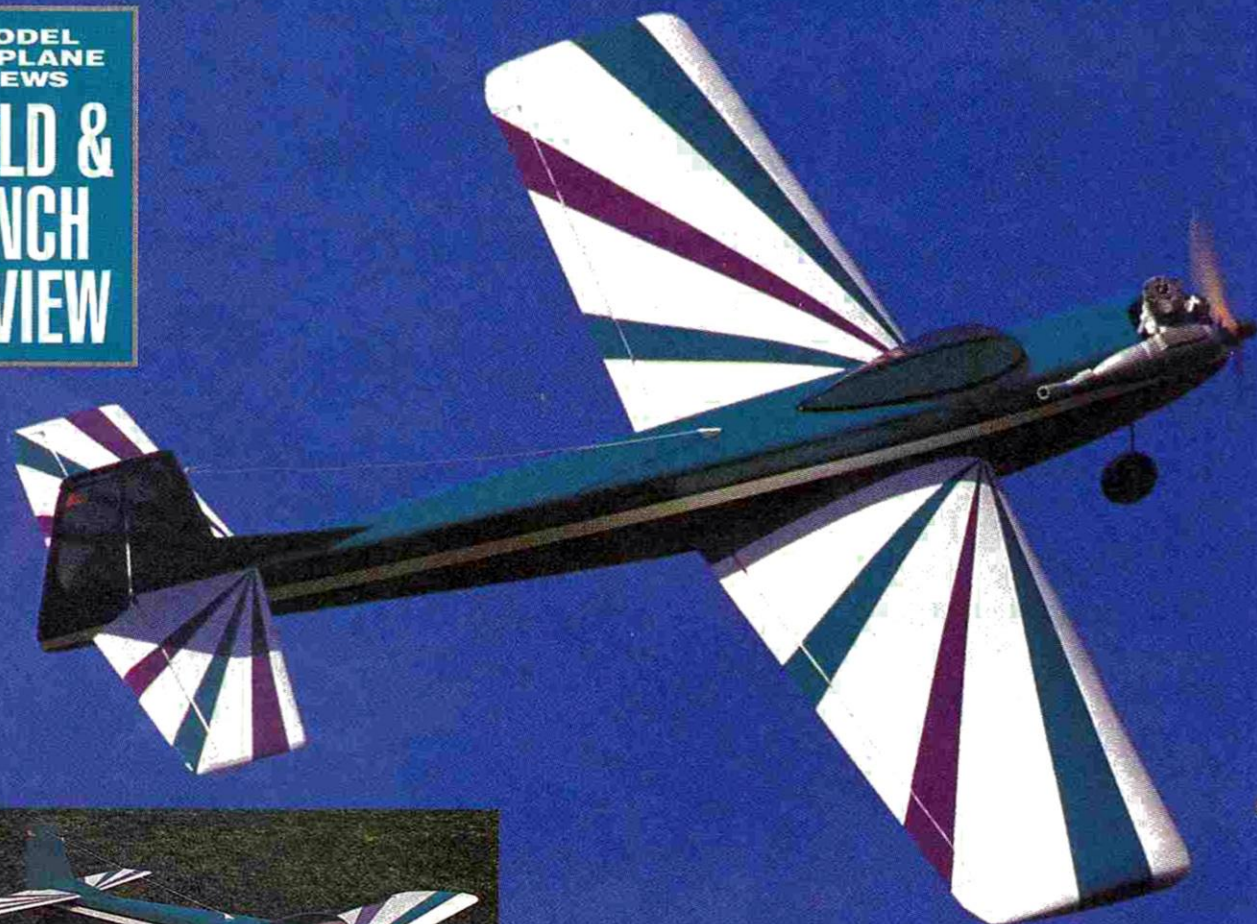
Well, that's the way to have really light wheels for that next WW I project. May your landings always be upright.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 126. †



MODEL  
AIRPLANE  
NEWS

## FIELD & BENCH REVIEW



Tower Hobbies

# KAOS 60

*Back by popular demand*

**N**early 30 years ago, Joe Bridi—one of the foremost pioneers of model aviation—released a design that dominated pattern competition for years. The Kaos was renowned for its agile characteristics. It performed well at all speeds and redefined the sport of model aerobatics.

In the '70s, the Kaos gave way to a new era of pattern ship designs such as the Eyeball and the Banshee, which featured more aerodynamic designs, tuned pipes and retractable landing gear. Many pilots, however, chose to modify the versatile Kaos with the same equipment and continued to compete with it successfully.

by STAN KULESA

Despite the quantum leaps in aeromodeling technology since then, the Kaos has been one of the few designs to remain in production. Some have even advocated using the Kaos as a trainer; this alone is a testament to its superb flying characteristics. By popular demand, Tower Hobbies\* has brought back into production an "oldie but goodie."

### GETTING STARTED

The kit is well-packed and comes with two sheets of rolled blueprints; die-cut balsa and plywood sheets; rubber-banded stock for leading and trailing edges and spars and capstripping; blocks, dowels, wing webbing, etc.; and hardware. The instruction booklet is well-written and user-friendly; it contains construction details and step-by-step photographs and provides a number of useful hints.

Empennage construction is pretty easy. The rudder consists of three,  $\frac{5}{16}$ -inch, solid-balsa parts and a balsa cap; the fin uses four,  $\frac{5}{16}$ -inch, solid-balsa parts. The

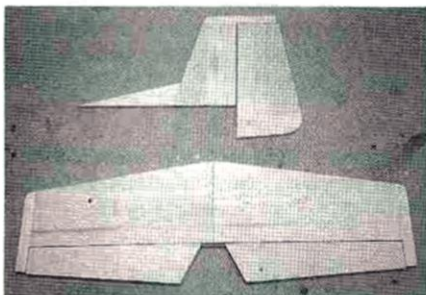
PHOTOS BY STAN KULESA & GERRY YAKUSH



stabilizer comes together using four,  $\frac{3}{8}$ -inch, solid-balsa parts; the elevator halves are also  $\frac{3}{8}$ -inch solid balsa. The elevator halves are connected by a preformed  $\frac{1}{8}$ -inch elevator joiner wire. That's it!

## WING CONSTRUCTION

The Kaos wing is fully symmetrical and is tapered in two directions (top/bottom and front/rear) from the center to the wingtip. Because of this, I highly recommend the use of a wing jig for construction. I used a



*The rudder consists of three,  $\frac{5}{16}$ -inch, solid-balsa parts and a balsa cap; the fin uses four,  $\frac{5}{16}$ -inch, solid-balsa parts. The stabilizer comes together using four,  $\frac{3}{8}$ -inch, solid-balsa parts; the elevator halves are also  $\frac{3}{8}$ -inch, solid-balsa parts. The elevator halves are connected by a preformed,  $\frac{1}{8}$ -inch elevator joiner wire.*

Great Planes\* wing jig (which costs \$20 and is well worth the investment). In anticipation of wing-jig use, each of the ribs has already been drilled to accommodate the wing-jig steel rods.

If you choose not to use a wing jig, the kit has a  $\frac{1}{4}$ -inch balsa jig that fits under the trailing edge. If you choose this method, be certain to line up the edge of the jig at the same point of each wing panel. Otherwise, you risk building a twist into the wing.

The leading and trailing edges have notches into which the ribs fit snugly. The outboard ribs have die-cut lightening holes. Hardwood for wing construction includes the landing-gear assembly, the dihedral brace assembly and the wing hold-down assembly. The wing is built in halves.

Since I chose to build the wing using a jig, my construction steps varied from those in the construction manual. After slipping each of the ribs into place on the  $\frac{1}{4}$ -inch rods, I glued the leading and trailing edges and top main spar to the ribs using Great Planes thin CA. I then attached the top and bottom trailing-edge

## SPECIFICATIONS

**Model:** Kaos 60

**Type:** pattern trainer

**Manufacturer:** Tower Hobbies

**Wingspan:** 61.5 in.

**Wing area:** 707 sq. in.

**Weight:** 7.5 lb.

**Wing loading:** 24.5 oz./sq. ft.

**Airfoil:** symmetrical

**Engine req'd:** .60 - .65 2-stroke, or .70 - .91 4-stroke

**Engine used:** O. S. Max .61 SF

**Radio req'd:** 4-channel (aileron, rudder, elevator, throttle)

**Radio used:** Airtronics\* Spectra PCM

**List price:** \$89.99

**Features:** CAD technology; full-size rolled plans; interlocking, all-wood construction; preshaped, notched, leading and trailing edges; pre-cut ailerons, elevators and rudder; formed, wide-stance, wire tricycle

landing gear; molded, clear-plastic canopy; all pushrods, horns and clevises; and photo-illustrated instructions.

**Comments:** the advertisement for the Tower Hobbies Kaos 60 states that it is an "awesome pattern trainer" with "decimal-point precision in maneuvers ... tracks like an arrow." This statement represents truth in advertising. The Kaos's thick, fully symmetrical airfoil minimizes speed buildup during diving maneuvers for added security. The Kaos has thrived over the decades because it's truly a joy to build and fly.

### Hits

- Good-quality balsa and plywood; die-cut parts.
- Doesn't take long to build.
- Illustrations for both 2- and 4-stroke engine installation.
- Excellent construction manual.

### Misses

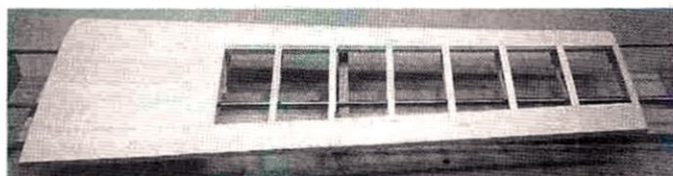
- Throttle pushrod wire provided in the kit was too thick and resulted in binding.

sheeting and the top leading-edge sheeting; this strengthened the wing and secured the proper alignment. Finally, I added the top center section  $\frac{3}{32}$ -inch balsa sheeting and capstripping.

I then removed the wing from the jig, leaving the two  $\frac{1}{4}$ -inch rods in place. I turned it over and set up a support on either end. I glued in the  $\frac{1}{4} \times \frac{1}{2}$ -inch bottom main balsa spar using thin CA and epoxied the landing-gear block assembly in place using Great Planes 30-minute epoxy. The vertical-grain balsa wing webbing was installed at this time. The one

plywood wing web (at the center section) is carefully spaced to allow the dihedral brace to fit. After gluing the bottom, center-section,  $\frac{3}{32}$ -inch balsa sheeting and capstripping, I removed the  $\frac{1}{4}$ -inch, steel, wing-jig rods using a twisting motion. Then I repeated the above steps to build the other wing panel.

The two wing halves need to be sanded and then joined. I used 30-minute epoxy for this job since it offers extra time for realignment and greater strength in this high-stress area. After installing the two aileron torque-rod assemblies, I reinforced the center section with 4-inch



*The Kaos's wing is fully symmetrical and is tapered in two directions (top/bottom and front/rear) from the center to the wingtip. Therefore, I recommend the use of a wing jig for construction. In anticipation of wing-jig use, each of the ribs has already been drilled to accommodate the wing-jig steel rods.*

Great Planes fiberglass cloth tape and glued it with thin CA.

Wing construction concluded with attaching the wingtips, cutting the ailerons to size, carefully measuring and installing the dowels and positioning the wing-bolt plates and main landing gear.

## FUSELAGE CONSTRUCTION

The fuselage sides are made of three balsa pieces and an  $\frac{1}{8}$ -inch plywood doubler. Along with lightening holes, the plywood doublers have notches to ensure straight assembly. I used Great Planes thick CA to attach the plywood to the balsa sides. Pre-cut left and right plywood firewall spacers provide the proper amount of side thrust.

Assemble the fuselage upside-down over the plans and pin the formers to the cross-braces before you attach the sides. I used a Hobbico\* Builder's Triangle Set to properly align these formers and cross-





## TOWER HOBBIES KAOS 60

braces. The 1/8-inch, die-cut, plywood fuselage top fit nicely into the notches in the plywood fuselage doubler. I used thin CA to glue the balsa formers and thick CA to glue the plywood. Using this construction method, proper fuselage alignment was easy. The rear bottom of the fuselage uses 3/32-inch cross-grain balsa sheeting.

The wing is test-fit to the fuselage for proper alignment. Once aligned, drill holes through the plywood plates on the bottom of the wing into the wing-mounting plate. Then tap the wing-mounting plate for the 1/4-20 nylon wing-hold-down bolts.

I fuelproofed the inside of the tank compartment with Coverite clear epoxy paint and installed a 14-ounce Great Planes fuel tank. To finish off the fuel system, I used Great Planes silicone fuel-line tubing and an ultra-precision fuel filter.

To complete the fuselage construction, I glued together the two-part 3/8-inch balsa sheeting for the top of the fuselage, the 5/8-inch balsa chin block and the 3/8-inch balsa cheeks on both sides of the fuselage. A framed wing belly fairing nicely ties the bottom of the fuselage and wing together. Again, I used the triangle set to properly align the fin with the stabilizer and then attached the fin to the fuselage.

## RADIO AND ENGINE

Plastic pushrod guides and one-piece aluminum wire pushrods with one threaded end were provided in the kit. The guides are routed through the fuselage in the direction of the control surface/function. I needed to replace the throttle pushrod because the wire was just too thick and caused binding. The kit also includes horns for the elevator and rudder and torque rods for the ailerons.

The three servos for throttle, elevator and rudder are affixed toward the rear of the radio compartment. The aileron servo is sunk into the center section of the wing. (For those more comfortable using two aileron servos in the wing panel, there is plenty of room.) Although there's plenty of room for the battery to fit under the tank, for balance purposes, the battery was placed over the CG. The receiver was placed into a Great Planes receiver shock-mount box. (This mount box is made of 1/16-inch plywood and is lined with foam rubber; it isn't included in the kit.) The antenna was routed through the top of the fuselage just behind the canopy. I used a

For power, I chose an O.S. Max .61 SF mounted on a Great Planes .40 to .70 adjustable nylon engine mount.

Du-Bro\* antenna exit assembly. To get a good tight fit and minimize fuel seepage into the radio compartment, I used Great Planes wing saddle tape.

For power, I chose an O.S.\* Max .61 SF mounted on a Great Planes .40 to .70 adjustable nylon engine mount. The engine swings an 11x6 prop during break-in. I used a Great Planes 2 1/2-inch white spinner.

I coated the engine compartment with 30-minute epoxy and got a small lip of epoxy over the MonoKote\* covering to seal the edges and minimize fuel seepage.

## FINISHING

There is an above-average amount of carving and sanding required to get the proper aerodynamic shape on the fuselage and wingtips. To speed the process and minimize the amount of sanding, I used a Master Aircress\* razor plane and stripper.

I covered the model with dark teal and light purple MonoKote over a white base, with Great Planes 1/4-inch black pinstriping for trim. I used a Top Flite Hot Sock over the iron to minimize scratching. When I finished covering, I removed the sock and ironed all seams to ensure the best possible seal.

I soaked the provided clear plastic canopy in black Rit dye for about 30 minutes to tint it and attached it to the fuselage using thin CA. I trimmed the canopy with the 1/4-inch black pinstriping. Great Planes 2 1/2-inch wheels and 5/32-inch wheel collars were used on the tricycle landing gear.

## CONCLUSION

This is the fourth Kaos I've had the pleasure of building, and I must say I was anxious to finish it, knowing that it is one great flying model. Fortunately, it doesn't take a lot of time to build; mine took about three weeks. Tower Hobbies resurrected one of the all-time model airplane greats when they re-introduced the Kaos. Even though it's marketed as a pattern trainer, I think it's one of the top sport models available.

Addresses are listed alphabetically in the Index of Manufacturers on page 126.

## FLIGHT PERFORMANCE

elevator was needed after the right aircress had been achieved. Its ascent was gradual. Once airborne, trim adjustments to the model included two clicks of down-elevator and one click of right aileron. With these minor adjustments, it flew very straight.

Since the Kaos tracks so nicely, landing was a matter of lining up with the end of the runway and dropping throttle. The plane settled nicely and required just a little up-elevator before touching the ground.

### • Takeoff and landing

Because of its wide-stance tricycle landing gear, the Kaos tracks well on the ground. Taxiing is very responsive. For takeoff, I throttled up and fed in very little rudder. To get the Kaos off the ground, just a little up-

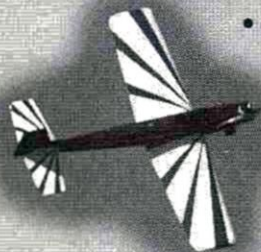
### • Low-speed performance

The thick airfoil in this model's wing center section contributes greatly to slow flight. At 1/3 throttle, the Kaos maintains its altitude. I made a few low passes at about 15 feet and banked the model to show the top of its wings with minimal effort. The Kaos "goes where you point it." I picked up some altitude, got straight and level, dropped the throttle and gently pulled the nose up for the stall leading into some spins. The spins were tight and had a gentle snap. Due to the large rudder area, stall turns were particularly crisp.

### • High-speed performance/aerobatics

I intentionally powered my Kaos with a long-stroke O.S. Max .61 SF for the extra muscle required for high-speed flight. Within minutes of making the trim adjustments, I put it through its paces. Loops were large and round and accomplished with minimal effort. Likewise, Immelmans and split-S turns were done with precision. The Kaos easily handled knife-edge flight at full throttle, but it had a tendency to fall out at 1/2 throttle. Several rolls were done right on the axis. I fed in a gentle amount of up-elevator to get the nose up just before entering the rolls. Inverted flight required just a little down-elevator.

At the end of the initial flight, I passed the transmitter around to give the other guys at the field a chance to enjoy flying this model. Each had favorable comments about how well it handled. My favorite comment was, "What do you expect? It's a Kaos!"





by LARRY MARSHALL

MODEL  
AIRPLANE  
NEWS

# FIELD & BENCH REVIEW

**M**ODEL AIRCRAFT POWERED by Graupner\* Speed 400 or similar-size electric motors seem to be taking our hobby by storm. Everywhere you look, people are flying sailplanes, warbirds, sport planes and multi-engine aircraft using these tiny motors. And why not? These motors are relatively inexpensive, and the planes powered by them perform well and can be flown from sites that would be unsuitable for larger models.

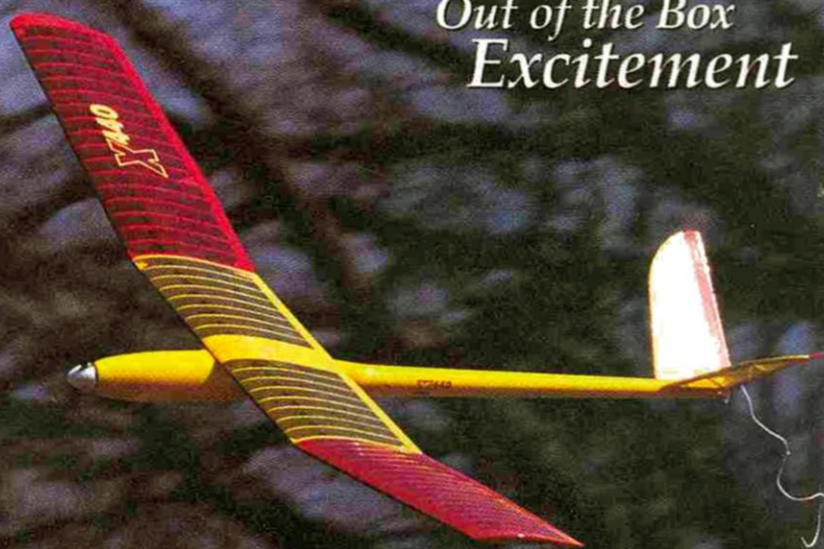
This interest has spawned a whole new set of questions from modelers wanting to get into electric flight. Because electric power is new to them and because an electric power system consists of several components that must be properly matched, some people find it a bit mind-boggling when we electric guys start twiddling numbers in answer to simple queries.

Seeing this, Larry Sribnick of SR Batteries\* reasoned that if he could produce a first-class airframe and couple it with pre-packaged power systems, he would satisfy the needs of a large number of newcomers to electric flight and, at the same time, provide a first-class competition sailplane that anyone would be proud to own and fly. I think he was right, and with his X440 and the very complete power systems he makes available, he has really opened the door to electrics for the guys who'd rather fly than do arithmetic.

SR Batteries

# X440

*Out of the Box  
Excitement*





## THE KIT

The wings of the X440 come completely finished and are covered with transparent yellow and red covering. They feature carbon-fiber spars and joiners, and the balsa construction is well-done. The same is true of the tail surfaces.

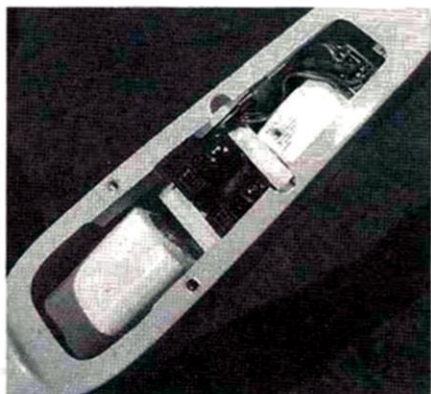
The fuselage is fiberglass, with a yellow

it in place is all there is to installing the motor. The on/off switch for the receiver battery is mounted wherever it suits you, and a Velcro®-brand fastener in the appropriate location holds the battery in place.

• **Radio installation.** The X440 has a unique method of holding the two microservos in place. The servo rails are slotted to accommodate the servos. One is already glued to bearers on the fuselage sides. Installation is a simple matter of drilling two holes, setting the servos in place and using two screws to hold the other servo railing in place—really slick. Pushrods are included, and the hardware is superb, with ball links being used to attach the rods to the V-tail. I used Velcro® to hold the receiver in place.

The control linkage rods are pre-assembled, with ball links on the tail end and clevises on the servo ends. It's a simple matter to run these through the fuselage and hook them to the balls attached to the V-tail, and minor linkage adjustments can be made at the servo end.

Because this is a V-tail plane, you must set up the mixers on your radio to handle V-tail control. This can be done using a



The radio and battery areas are well-organized.

V-tail option or with the elevon option. How this is done depends on your radio. I was using an Airtronics® Radiant, and it's a simple matter of cursoring to the elevon function and turning it on, or turning on V-tail and then slaving rudder and aileron together to get the control to the right stick. Either way works. If you don't already own a programmable radio, you might want to consider the Radiant as SR Batteries makes it available with a micro receiver, microservos and small receiver pack that they've assembled—in conjunction with Airtronics—for the X440.

• **Balancing.** To attain the proper balance, move the motor battery forward and rearward until the X440 balances at the



How many editors does it take to screw on a wing? Gerry Yarrish, Debra Sharp and Larry Marshall prepare the X440 for flight.

gelcoat surface. The firewall, servo rails, etc., are already installed. Mount rods for the tail and wing-bolt inserts are also pre-installed.

## ASSEMBLY

The X440 would fit in the category of almost-ready-to-fly (ARF), but it probably should have its own category called something like "RCARF" (really-close-to-ready-to-fly). There is literally no construction involved in assembling this airplane.

• **Wings and tail surfaces.** The single thing that must be done with the wings is to remove the covering from the pre-drilled holes for the wing bolts. Though there weren't any warps in my set of wings, you should check each panel anyway as plastic covering has a way of stretching and contracting during shipment, sometimes inducing warps in wings.

You must attach a control horn to each of the V-tail flying surfaces using the screws provided. The holes are pre-drilled, so this is an easy task. Hinging of the control surfaces is done with heavy tape that is provided. The flying surfaces then simply slide onto rods that are pre-installed in the fuselage.

• **Motor installation.** The firewall of the X440 is pre-drilled to accept the motor system, so the simple process of dropping it into the nose of the fuselage and bolting



Launch of the X440 is easy, and climb rate is very good with the performance package.

## SPECIFICATIONS

**Model:** X440

**Type:** electric sailplane

**Manufacturer:** SR Batteries

**Wingspan:** 63 in.

**Wing area:** 440 sq. in.

**Weight:** 23 oz.

**Radio req'd:** 3 channels (microservos), programmable for V-tail

**Radio used:** Airtronics Radiant

**Motor used:** AP-29, 4.4:1 geardrive, JETI-30B, and 8-cell SR 500mAh pack

**List price:** \$229.95

**Features:** a pre-assembled/covered wing with carbon-fiber spars, a fiberglass fuselage and covered V-tail surfaces. SR makes a wide range of complete power systems available for the plane.

### Hits

- High degree of prefabrication.
- Very complete package.
- Good flight characteristics.
- Complete step-by-step assembly instructions.

### Misses

- None.

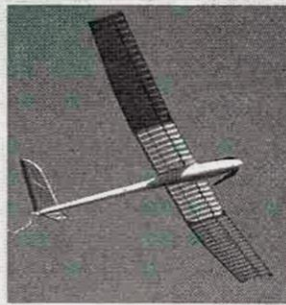


## FLIGHT PERFORMANCE

### • Takeoff and landing

Launching the X440 is easy with the performance motor system, as once you power up, it really wants to leave your hand. A gentle push, and it's heading skyward rapidly. I found the X440 to be very stable in climb—much more so than many electric sailplanes I've flown. As indicated in the instructions, it's a good idea to mix a bit of down trim with throttle.

Landings are easy. For those with limited sailplane experience, expect the X440 to land just a bit faster than what you might be used to with very lightly loaded 2-meter sailplanes. But even so, we were flying from a baseball diamond, and I had no problems getting it back on the ground.



### • Low-speed performance

The X440 is impressive in a power-off condition. It settles nicely into a glide and feels "light" when thermalling. I found that tight circles were no problem with this plane, and it remained rock-solid even while grabbing small lift bubbles. Most of the time I was flying low for the camera, but even there I was able to grab some lift in much the way I would with a hand-launched sailplane.

### • High-speed performance

Under power, the X440 wants to climb. Without some down trim it will climb straight up, but for best climbs you really want a bit of angle to the climb to maintain good speed. The plane does quite well—with considerable down trim—at powering in level flight. This should be handy if you're sport flying and simply want to go thermal hunting.

suggested CG location. Velcro® is provided to hold the battery in place.

At this point, I found myself looking for something else to do. I thought, "It can't be



**Because of the ball-link attachments, the V-tail linkage is easy to assemble and disassemble. This makes removing the tail surfaces for transport an easy task.**

finished," but it was. The X440 was ready for flight in less than a leisurely two-hour session. Most odd of all is that the only tools required were a drill, screwdriver and some scissors to cut the hinge tape.

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 126.*

## X440 POWER SYSTEMS

One of the features of the X440 is provided through SR Batteries' approach to providing power options. Complete power systems are available, and all you have to do is choose which performance level you want. To make that choice, you are quickly introduced to the basic tenet of electric flight. You can use power quickly and get incredible performance, or you can use it more sparingly and give up a bit of performance. SR provides seven systems that cover the gradient between all-out performance and long duration. You'll also find that you pay for more performance, so that's another thing to keep in mind when selecting a power system.

I used the 8-cell "performance" system in the X440. It provides nearly vertical climb performance and yet provides enough motor duration for several climbs to altitude. But the most impressive thing about any of the SR power systems is the completeness of the package. You don't have to buy anything extra to assemble and install it. Each power system comes with two batteries.

This is important to me, as most people getting into electrics will generally buy one pack, only to be frustrated as they wait for it to charge between flights. By providing two packs, SR lets you fly while you charge and, with the X440, that pretty much means you can fly continuously.

The packs and controller come with first-class connectors pre-installed, so power system assembly is nothing more than plugging the components together. SR even provides the hard-to-find, odd-size screws required to hold the motors to the firewall.

The small planetary gearboxes that come with these packages are works of art. These come attached to the motors but can be purchased separately. Only with such a gearbox can you spin large enough propellers to fly a sailplane effectively.

In short, all of the SR power systems are first-class packages that use the best components available. You can't go wrong with any of them.

POWER SYSTEM	MOTOR	GEAR RATIO	PROP	NO. CELLS	APPROX. WT. (OZ.)	RPM	AMPS	DURATION (MINUTES)	CLIMB RATE	FLIGHT DURATION
Economy	Speed 400, 6V	4:1	11x8	7	22	4250	9.5	3.6	650	36.0
Sport	Speed 400, 6V	4.4:1	11x8	7	23	4160	8.2	4.2	550	35
Sport	Speed 400, 6V	4.4:1	11x8	8	23.5	4565	10.0	3.5	800	39.2
Performance	AP29BB	4.4:1	11x8	7	24	5160	16.7	2.1	1150	33.2
Performance	AP29BB	4.4:1	11x8	8	24.5	5610	20.0	1.7	1500	35.2
Competition LMR Class A	SR Max7	4.4:1	14x9.5	7	28	3875	22.7	1.5	1850	35.6
Competition LMR Class B	SR Max7	4.4:1	14x9.5	8	28.5	4200	27.0	1.3	2400	38.0





A better Bee—  
now with ailerons!

CLANCY AVIATION

# Lazy Bee

## Special

by JIM RYAN

**N**o single R/C model since the venerable Ugly Stik has achieved the widespread popularity of Clancy Aviation's\* Lazy Bee. These days, it's hard to find a flying field that doesn't have one of these comical little models buzzing around at low altitude and doing bizarre aerobatics. It flies equally well off land or water and with glow or electric power. The only thing the versatile Bee lacks is ailerons, that is, until now.

The Lazy Bee Special is an enhanced version of the original Bee; its polyhedral wing is replaced by a straight 40- or 50-inch-span wing with barn-door ailerons. The rest of the model is unchanged. Anyone interested in upgrading their existing Bee can simply order a wing kit from Clancy Aviation.

### CONSTRUCTION

The plans and instruction manual are first-rate, and the line drawings do an excellent

job of illustrating the assembly. The instructions are very clear, so there's no point in giving a blow-by-blow account here. The materials are bundled neatly, and the sticks are straight and light. The die cutting is acceptable, but the part numbers aren't marked, so you'll have to match the parts up with the plans. A few parts were a little on the hard side, but I didn't need to replace anything.

• **Wings.** The biggest news about this kit,



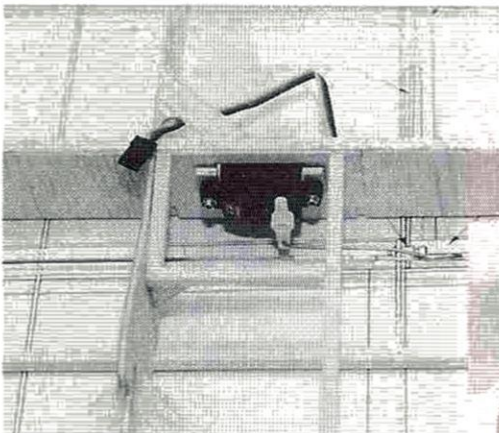
PHOTOS BY JIM RYAN



other than the ailerons themselves, is the structure of the wingtips. One of the few criticisms I've heard from other modelers about the standard Lazy Bee is that the builder has to laminate the curved wingtips, elevators and rudder. On the Special, die-cut balsa segments are glued up to make the elliptical tips. I chose the bolt-on wing option detailed in the plans. The structure is simple and straightforward, and I framed up the wing in a single evening.

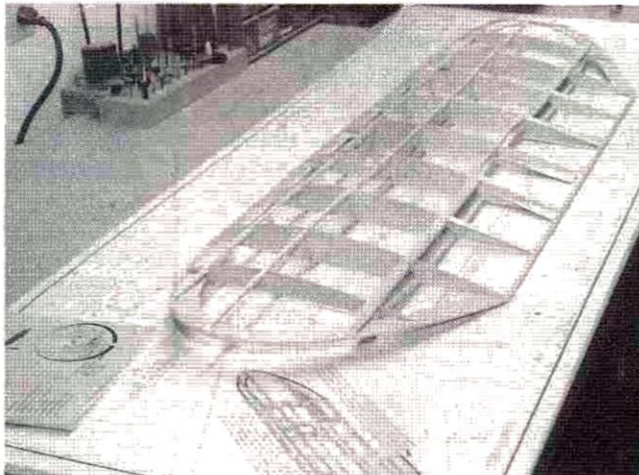
Andy Clancy recommends using the longer, 50-inch wing for electric versions of the Bee. This keeps the wing loading low, but it makes for a slower, float-type airplane. Since I wanted my Bee to be faster and more responsive, I leaned toward the shorter, 40-inch wing. I decided to build *both* wings and compare their performances.

• **Fuselage.** The fuselage is identical to that of the original Lazy Bee. Piecing together the sticks to make the fuselage takes some time, but there are no difficult steps, and if you follow the instructions, you shouldn't have any problems.



The microservo for the ailerons is mounted slightly off-center. Rather than install a true hatch, I framed an access opening with  $\frac{3}{16}$ -inch-square stock and then covered the opening with a Litespan patch. To service the servo, simply peel the patch loose.

The fuselage is identical to that of the original Bee. The Clancy Aviation-supplied laminations made short work of the empennage. Both the rudder and stab can be made removable for transportation.



Unlike that of the original Bee, the Lazy Bee Special's aileron wing requires no laminations. The wingtips are made up of four die-cut pieces. The wing structure is simple and light.

• **Empennage.** To make the already compact Bee even easier to transport, I opted for the removable stabilizer shown in the instructions. My review kit included the optional prefabricated rudder and elevator laminations, which are real timesavers for those who don't like doing laminations. They made this subassembly quick and easy to complete.

## MOTOR MOUNT AND LANDING GEAR

I used a SonicTronics\* motor mount, which makes it simple to secure the supplied 05 electric motor in a radial mount with a cable tie or hose clamp. The open nose of the Bee leaves plenty of room to install the glow engine or electric motor of your choice. Trexler balloon tires (available from Clancy Aviation) set off the Bee's Golden Age looks perfectly and make for feather-soft landings.

Clancy also offers an optional float kit that converts the Bee to a floatplane in seconds. In earlier electric versions of the Bee, the small tail float had a tendency to

## SPECIFICATIONS

**Model:** Lazy Bee Special

**Type:** sport/trainer

**Manufacturer:** Clancy Aviation

**Wingspan:** 40 or 50 in.

**Wing area:** 475 sq. in./615 sq. in.

**Weight:** 40 oz./42 oz.

**Wing loading:** 12.1 oz./sq. ft.; 9.8 oz./sq. ft.

**Airfoil type:** flat-bottom

**Length:** 26 in.

**Wing chord:** 14 in.

**Recommended power:** .09 to .26 glow engine or geared 05 motor with 7 cells

**No. of channels req'd:** 4 (aileron, elevator, rudder and throttle)

**List price:** \$69 (40-inch-wing kit), \$79 (50-inch-wing kit); \$15 (optional prefabricated elevator and rudder laminations); \$99 (Electrification Combo), \$134 (Deluxe Electrification Combo—includes charger).

**Features:** lightweight stick-built construction, Golden Age looks, unusual flight performance.

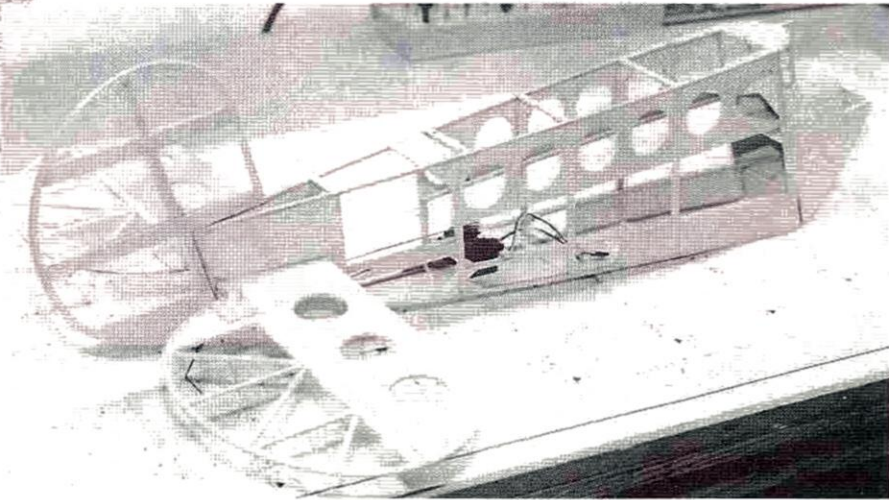
**Comments:** the Lazy Bee Special was enjoyable to build, and it truly exceeded all my performance expectations. The ailerons add a whole new dimension to a model that was already a lot of fun, and I expect a lot of happy Bee owners to upgrade to the new wing.

### Hits

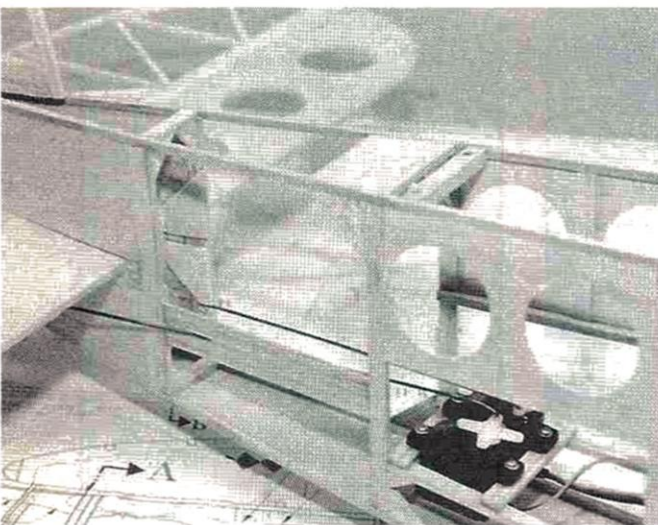
- Excellent plans and instruction manual.
- Tough but lightweight structure.
- Plug 'n' play power system suitable even for novice electric flyers.
- Available as an upgrade.

### Misses

- Ran short of some strip stock.







So that I could use perfectly straight pushrods, I moved the pushrod exits forward by adding a small piece of 1/2-inch-wide balsa strip. The narrow exit allows almost no play.

sink, but this has been corrected by making it slightly larger. The floats are die-cut from balsa, and assembly is simple. I covered them with lightweight fiberglass cloth and epoxy and painted them with K&B Superpoxy.

## COVERING AND ASSEMBLY

Andy Clancy recommends that you cover an electric Bee with Litespan\*—an interesting heat-shrink covering material made of non-woven polyester fibers. A water-based liquid adhesive called Balsaloc (available from Clancy Aviation) is applied only where the frame and covering touch (I thinned it about 20 percent). The Litespan takes a little getting used to, but I was pleased with the way it turned out. Because it doesn't shrink much, you need to "tug and tack" the material back and forth

around the airframe to work out all the wrinkles and get it taut before shrinking. All film coverings should be applied this way, but it's especially easy with Litespan and Balsaloc. Covering the entire model added just 2.9 ounces.

## FLIGHT PERFORMANCE

All flights were made from a parking lot or paved runway. Although Clancy Aviation supplies an 11x7 APC prop, *ElectriCalc*\* indicated an 11x8 was a better choice, and flight testing confirmed this; rate of climb was improved and all-around performance was enhanced.

### • Takeoff and landing

I first tested the 50-inch-span Bee. To take off, I taxied out, pointed the nose into the wind and gradually applied power while holding in a little right rudder. The little Bee made a leisurely roll down the runway and lifted into the air. On the first flight, I had the CG too far forward, and I needed several clicks of up-elevator trim, but rudder and aileron trims were hands-off. The CG was easily corrected by moving the Ni-Cd pack back about 1 1/2 inches, and all subsequent takeoffs have been pure joy.

Landing couldn't be easier. I flew a normal approach pattern and killed the motor on final. The Micro Demon 102

## THE ELECTRIC BEE

I built my Bee with electric power. By offering a complete line of matched electric components suitable for powering a Bee, including a Deluxe Electrification Combo with everything in one affordable package, Clancy Aviation has made it easy even for first-time elec-

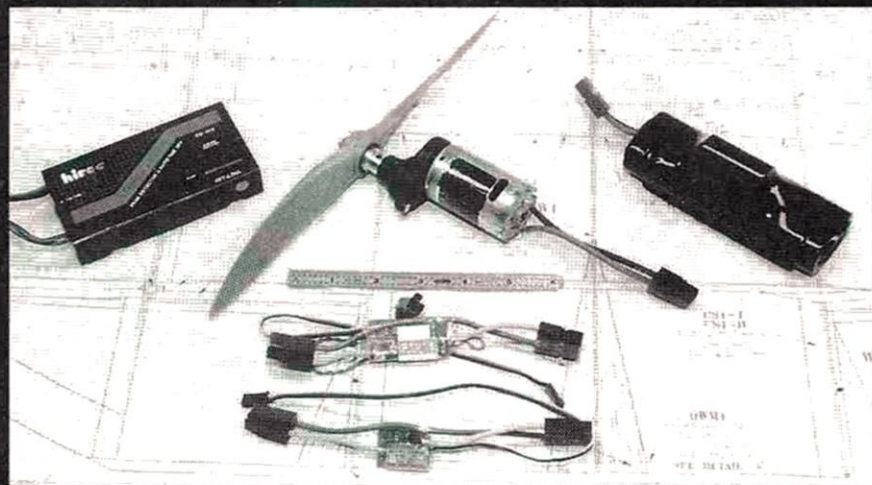
tric flyers to succeed.

The standard combo includes a 7.2V Master Airscrew\* 05 ferrite motor with 3:1 gearbox which, on 7 cells, will swing the supplied APC 11x7 prop at over 5,600rpm. Andy's selection of a geared motor for this application was an excellent choice. It provides better performance and efficiency to the slow-

flying Bee than a direct-drive motor would, and more manufacturers should follow this lead.

The package also includes a 1400mAh Trinity\* 7-cell Ni-Cd pack. These mass-produced packs use Tamiya connectors, and the cells are spot-welded rather than being soldered, but they're a quick, convenient solution, and at \$25, the price is attractive. Although Tamiya connectors have higher voltage losses than other connectors and become progressively looser with age, they'll work in a low-current application like this, and they have the advantage that newcomers to electric power can hook up the system without having to solder. Some time ago, I standardized my equipment with Anderson Powerpoles\* for their performance, ease of assembly and low cost, and I converted the Lazy Bee system to Powerpoles to make it compatible with my other components and measurement equipment.

Clancy Aviation now offers a choice of two high-frequency digital speed controls from Viper Model Products\*. High-frequency controllers allow more efficient operation at partial power settings; they extend flight duration considerably and make full-range throttle control truly practical. The Micro Demon 100 and the Micro Demon 102 give the builder the choice of non-BEC, which requires a small (i.e., 270mAh) receiver pack, or



The Deluxe Electrification Combo will get even a first-time electric flyer off the ground quickly. Clockwise from upper left: Hitec 7-cell fast charger, Master Airscrew 05 ferrite motor with 3:1 gearbox and APC 11x7 prop, Trinity 1400mAh 7-cell battery pack and choice of Micro Demon 100 or 102 speed controller. I replaced the Tamiya connectors with Anderson Powerpoles to match my other electric equipment.



controller has a brake, so I could stop the prop in a horizontal position (if it stopped vertically, I'd just blip the throttle until it stopped where I wanted it). This saves wear and tear on the prop, since an 11-inch prop has very little ground clearance. With any headwind at all, the approach speed is incredibly slow, and the 50-inch-span Bee lands like a feather. The rollout is extremely short, and you can fly the Bee from nearly any open area. If you're a little high for landing, crank in hard opposite rudder and aileron; the Bee Special does a great slip, and you can shed altitude in a hurry.

The day I tested the 40-inch-span Bee, I was obliged to take off with a 10mph right-to-left crosswind, but I needn't have worried; I just used a little less right rudder on takeoff, and the Bee ran straight as an arrow. There was a fair amount of turbulence near the trees, but nothing the model couldn't handle. I've also hand-launched the Bee a couple of times, and it couldn't be easier. Just run up the throttle, give the Bee a light toss, and you're flying.

I made my landing approaches with the short-wing Bee straight into the wind and

then made a gentle turn to line up on the runway. Landings were slightly faster, but the 40-inch-span model was also steadier in the wind. I was truly surprised how well it handled crosswind takeoffs and landings.

### • High-speed performance

One of the funniest sights of my R/C career was a Lazy Bee pylon race in near gale-force winds. The Bee simply isn't designed to go fast, and mine has a top speed of around 30mph with the big wing and 35mph with the short

wing. Still, at full power, the Bee is stable and easy to control. With the short wing, flight speed was noticeably faster, and the aircraft was more responsive. I could do fast grass-skimming figure 8s, and the aircraft reacted beautifully.

### • Low-speed performance

This is where the Bee shines. The Lazy Bee Special is very happy at reduced power settings, and this extends endurance to 10 minutes or more with the supplied pack (over 15 minutes with a 1700SCR pack). If you're just puttering around, 20- to 25-minute flights are possible with the big pack. You really have to work at it to make the Bee stall in level flight, and the stall is gentle and straight ahead. Simply release backpressure on

the stick, and the model is flying again.

With the short wing, low-speed flight is still predictable and stable, but the model does want to fly a little faster. This was helpful in the breezy test-flight conditions because I didn't have to waste a lot of power fighting the wind.

### • Aerobatics

The Lazy Bee Special's whole reason for being is to expand the original Bee's bag of tricks, and it certainly delivers. With the big wing, the electric Bee easily handles repeated loops from level flight. Aileron rolls are fairly slow but very axial, and you can also do rudder/elevator snaps—just as you can with the original. Sustained inverted flight is no problem, although with the mass of the battery pack low in the fuselage, you do need to keep correcting. Only moderate down-elevator is needed to maintain altitude while inverted.

With the short wing, the aerobatic envelope opens up considerably. Loops are still crisp and easy, although if you try to do multiple high-G loops, the Bee might try to snap out at the top. The roll rate is much faster, and multiple rolls are no problem. With increased familiarity, rolling circles should be possible. I got my best spins by punching the throttle on the entry. Spins are tight and fast with the short wing, and recovery is positive if you center the controls and then ease the plane out of the dive. As with the big-wing version, sustained inverted flight is easy, and I had no problem getting the Bee to fly a ground track while inverted.

BEC, which runs the receiver and servos off the motor Ni-Cds. Because they're digital, these devices are truly "plug 'n' play"; they need no endpoint adjustment. They also include a host of safety features such as soft-start, safety-start and fail-safe. If you're new to digital controllers, you'll be surprised by the tiny size of these units, which make extensive use of surface-mount devices (SMDs). I flew the Bee with both controllers, and they worked perfectly. I suspect you'll be hearing more from Viper Model Products, because owner Vic Newton told me they have a 16-cell, 35A controller for higher power systems, and they're developing an even smaller micro controller for Speed 300 and indoor applications. Visit their website at <http://www.vipermodels.com/> for more information.

The Deluxe Combo also includes a Hitec Charge-A-Matic peak detection charger. While limited to 7 cells (higher cell count chargers require a step-up transformer), this is a nice utilitarian unit; just connect the pack, push a button, and wait.

The beauty of Andy's system is that it eliminates the endless choices and guesswork for novice electric flyers. For about \$100, the Lazy Bee Special can be set up with a proven electric power system that works right out of the box.

Per Andy's recommendation (and to keep weight to a minimum), I used micro radio gear, including an FMA\* Micro 2000 receiver and Hitec\* HS-80 microsensors. The capacious fuselage allows plenty of room for installing any type of radio gear, including standard servos, but expect performance to suffer if you use heavier equipment. I made a door in the side of the fuselage to allow battery packs to be easily changed, as shown in the plans. With everything complete, I set the Bee on my electronic scale and was pleased to see that it weighed just 42 ounces with the flight battery. At 40 ounces, the short-wing version was even lighter.

### BUILDER'S THOUGHTS

The Lazy Bee Special was enjoyable to build, and it truly exceeded all my performance expectations for its inexpensive power system. The ailerons add a whole new dimension to a model that was already



Float-flying made easy. The Bee is a nearly ideal floatplane, and the floats are a snap to build.

a lot of fun, and I expect a lot of happy Bee owners to upgrade to the new wing.

In the end, I'm very glad that I built both the long and short wings; it's like having two different aircraft. Which should you choose? It depends on your skill level and the kind of model you're looking for. If you're building an electric Bee and want an aircraft that's slow and gentle, but still has aerobatic capabilities, go with the 50-inch wing. If you want an airplane that's faster and more responsive, go with the short wing. Or, best of all, build both!

\*Addresses are listed alphabetically in the Index of Manufacturers on page 126.





## **Because the best radio gear... ...is no better than its batteries!**

Most of you have heard of SR Batteries. You've probably even heard that we make great battery packs. However, you've probably *also* heard that our packs are more expensive than the packs from "the other guys."

Well, it's true. We are more expensive... because we're better!

For over 15 years we've made the best custom packs you can buy. We've done it because we're modelers and we want to be proud of what we do. We also want to save you some airplanes.

You're probably not aware that most of SR's business is in the military/aerospace industry. Our customers include NASA, Lockheed, Boeing, the Army, Navy, Marines and Air Force, the Jet Propulsion Laboratory, The Hubble Space Telescope, the Space Shuttle Program, the Mayo Clinic, Johns Hopkins University, AeroVironment, and the Harris Corp. to name just a few.

We're really proud of our newest project. SR was selected as the only company to make the emergency backup battery packs for Northstar's new M3, IFR panel mount GPS for General Aviation.

You're probably wondering why we make packs for the R/C field when we have so much to do for the military/aerospace industry. It's simple. The President of SR Batteries, Larry Sribnick, has been a serious modeler for well over 40 years. To him, your aircraft is no less important than any of the other projects we work on. We try to employ modelers whenever possible and the cardinal rule is, "If we wouldn't feel comfortable about using a pack in one of our own airplanes, we don't let it get out the door!"

OK, it's time for specifics. What does SR do in making a pack that no one else in the R/C field does?

- All SR cells are *screened and*

*matched Aerospace Grade* cells. These are not your usual consumer type inexpensive cells. They are exactly the same cells we use for our military/aerospace applications.

- Only SR *guarantees* its cells and packs not to ever form a memory and warranties each pack for one year.
- Only SR puts *every* pack through five days of electronic testing to make sure *every* pack is perfect. These tests include a test of capacity, charge retention, and a vibration test for mechanical integrity.
- All *welded* internal and external construction. Would you believe that some companies sell cells where the internal connections are nothing more than a press fit? We don't even have soldered connections, except for the connector leads themselves.
- Even the straps we weld from one cell to another are an SR exclusive. Each strap is strain relieved so that no vibration or stress is transmitted to the welds at the end of each cell. No one else has this feature!
- All SR packs can be fast charged. Of course no cell will stand up to extreme overcharging but all SR cells have the lowest possible internal impedance so that fast charging isn't a problem.
- All SR packs give you more flying time with less size and weight. Our packs are continually growing in capacity while shrinking in size and weight. Our 1000 Series receiver pack, for instance, is smaller and lighter than the standard 500mah pack that comes with many new radio systems, but it has twice the capacity and flying time.
- No other company gives you the range of receiver and transmitter

packs that we do. We never have to try to "fit a round peg into a square hole" because we don't make a particular size cell. Our cells range from 50mah to 10,000mah in capacity.

- Custom packs. Now, that's what we're all about. While other companies force you to buy what they make, we sell you what you want. A 5 cell pack rather than a 4 cell pack? No problem! 36" leads on the pack? No problem! A special shape pack? No problem! A JR and Futaba connector on the same pack? No problem. You name it, we'll do it. And, normally, at no extra cost!
- Did you ever try calling the "other guys" with a technical question? Did anyone there have any idea of what you were talking about? Only SR maintains a *Hotline* phone number, 516-286-0079, where you can call for help with *any* R/C problem or question, battery related or not!

Using SR packs, thousands of contests have been won, national and world records set, and national championships awarded to modelers around the world. A short list of just some of our customers would include: Bob Aberle, Joe Bridi, Dave Brown, Byron Originals, Hal DeBolt, Bob Dodgson, Dr. Walt Good, Robert Gorham, Dick Kidd, Ivan Kristensen, Don Lowe, Eloy Marez, George Myers, Dean Pappas, Dave Platt, Nick Zirolli, etc., etc.!

If you'd like more information or have a question, drop us a note at SR Batteries, Inc., Box 287, Bellport, NY 11713, Fax: 516-286-0901, Email: 74167.751@compuserve.com or call 516-286-0079 between 9am and 5pm Monday through Friday, Eastern Standard Time.

-ADVERTISEMENT-



## A walk on the lighter side

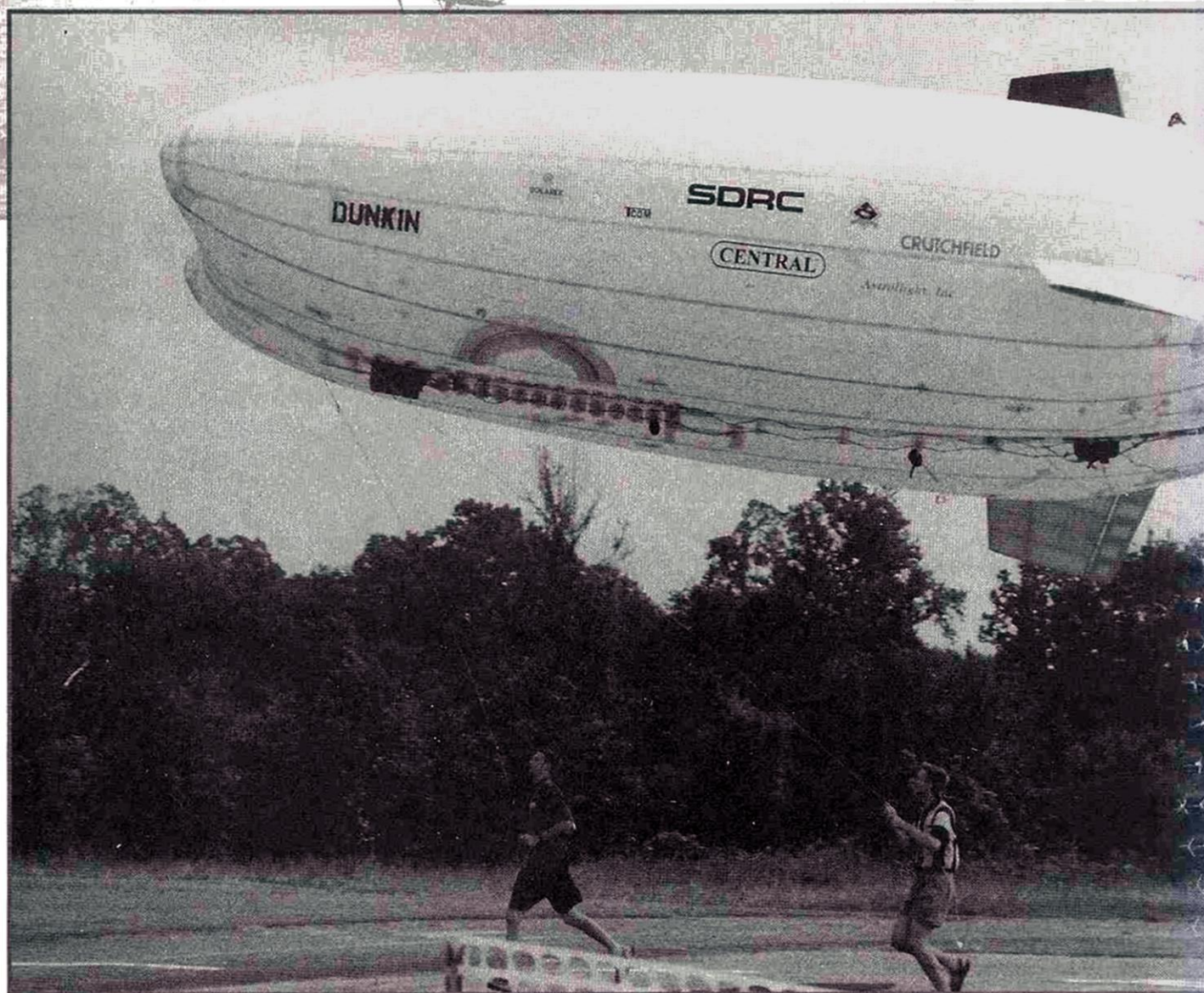
**I** HAVE LONG been fascinated with the simple beauty and grace of lighter-than-air (LTA) models. My first exposure to them was at a summer science class in aeronautics taught by Bill Warner (more years back than

either of us would like to remember!). We were ushered into the classroom to find a small, FF rubber-powered blimp turning circles in the middle of the room. The model was so stable that it seemed to be riding on rails.

He taught us, among many other things, how to build these little models, and I've since learned to make my own blimps with full R/C control.

# R/C Blimp Modeling

by TONY  
AVAK



*Dunkin flies at the University of Virginia.*



I've had the opportunity to fly them in many public places where they are always greeted with smiles and lots of questions. Because the LTAs are super easy to fly, I'll often let kids get their first R/C experience on my blimps. Actually, I get my greatest enjoyment from just watching blimps float effortlessly in the air for minutes at a time without touching the controls.

LTA craft actually have more in common with submarines than airplanes; they float in the air like subs float in water. Properly ballasted, they can hang in the air indefinitely. Blimps have a great glide ratio!

One of the big secrets about LTA modeling is that it is all very simple and low-tech. In fact, with the exception of helium, the average modeler already has all the tools and materials on hand to make a simple airship. A workable model can be made from a plastic trash bag or drop cloth and a few dollars' worth of balsa and

electric motor geared down to spin a 6-inch prop. The motor is powered by a pack of three AA alkaline cells that can fly it around for over an hour. HiLine makes similar motor assemblies. Because they're so energy efficient, full-scale airships may soon be making a comeback to transport very large objects with very little fuel.

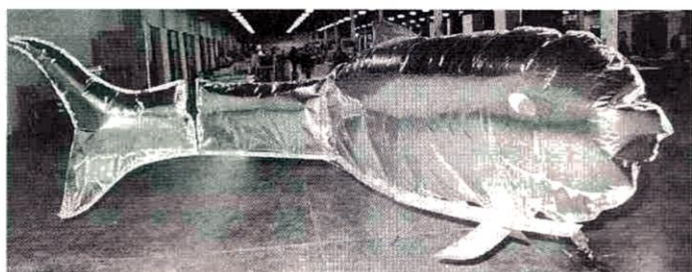
## LTA CLASSIFICATION

A "balloon" is any unpowered LTA craft, typically using hot air or helium for lift. An "aerostat" is a tethered balloon, usually equipped with stabilizing fins. "Dirigible" comes from the Latin *dirigere*, "to direct," or "capable of being steered," and has come to include any LTA craft

that can control its movement in all directions through the air. A "blimp" is a dirigible that is made of a single, pressurized bag that would lie flat if all the lifting gas were removed. "Airship" is the name given to any of the largest LTA craft (the giant rigids like the



**Lisa Dodd with a variation on an R/C blimp available from John Piri. Steering and thrust are provided by varying the power to the motors at the end of the gondola pylons. The model is 4 1/2 feet long.**

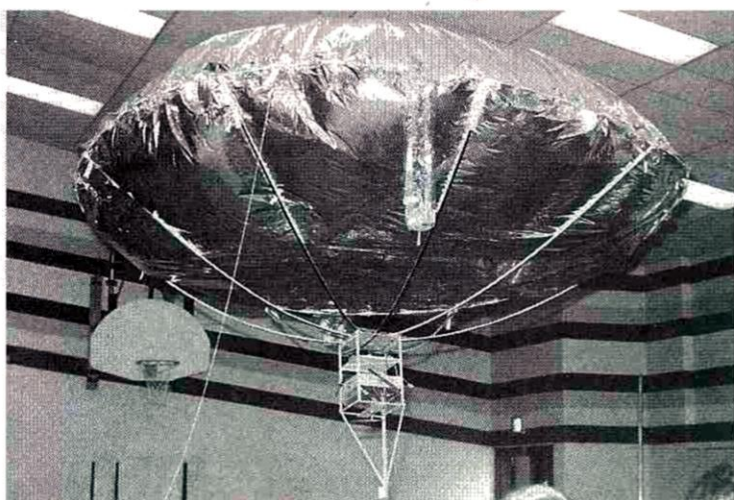


**The author's "Shark" Blimp at the 1996 East Coast Hobby Show in Ft. Washington, PA. It is composed of three separate blimps connected by hinges along the keel. The two aft bags are articulated by a servo and act as the rudder for the foremost bag, while the ventral fins move to give it up/down control.**

other materials. With a small electric motor to move it around and a 3-channel radio to steer it and work the throttle, anything with a bag big enough to make the craft float can "fly."

All the models described in this article are for indoor use only. Although they can be taken outside, they do not need much to push them around, and a wayward gust or thermal can easily carry them away—even on a calm day. Unless your ship can do at least 15mph in still air, I wouldn't take the chance of losing it outside.

Conversely, LTAs are perfect for indoor flying. The gas provides all the "heavy lifting," so a tiny motor can fly even a large model with ease. My 14-foot-long "Shark Blimp" is powered by a VL Products motor assembly that consists of Mabuchi



**Students from Thomas S. Wootton High School in Gaithersburg, MD, test-fly their 10-foot-diameter R/C saucer blimp in preparation for the Autonomous Flying Machine Competition in Atlanta, GA. The triangular structure below the body contains a magnet for picking up and releasing a 4-ounce metal disk.**

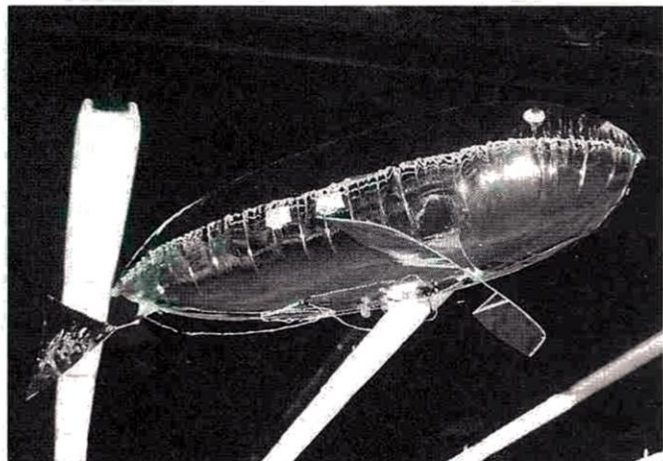
PHOTOS BY TONY ANNE



## R/C BLIMP MODELING



**Left:** Judy Murdock holds husband Mark's blimp. As the sign on the side implies, they rent out the blimp for display at malls, shows, or parties. (Photo by Mark Murdock.) **Right:** Mike Dodd's 7 1/2-foot-long R/C "Fish Blimp." The model uses a servo to flip the tail back and forth for both propulsion and steering. A second servo controls the horizontal fins for up/down control.



Graf Zeppelin), though it can also generically refer to any powered LTA craft. In the rigids, the gas is contained in a series of individual bags, or "cells," surrounded by a skeleton of girders and covered in a protective outer skin. A "zeppelin" more correctly refers to any rigid airship built by Count Ferdinand von Zeppelin (1838 to 1917) or his company; the Hindenburg is a well-known example. There is also the "semi-rigid" airship, which has a rigid keel from nose to tail along the bottom to hold all men and equipment, but contains the gas in a blimp-like bag above. There are other, more exotic hybrids, but I won't get into them here.

### LTA MODELING

The smallest R/C blimp I have built is my "Li'l Red." Only 40 inches long, it is a single-channel, rubber-powered model that weighs only 1.1 ounce without helium. The advent of new, super-small R/C systems like the 9-gram unit on Red makes it possible. For more information about such systems, write to Cloud 9 R/C—a new organization dedicated to wee R/C. For only \$10 per year, the club newsletter will keep you up to date on all the newest and lightest R/C

systems available.

Many people have seen R/C blimps flown at indoor stadiums across the country. These blimps are brought out at timeouts and intermissions to advertise a product and entertain the crowd. They can follow an ice machine around a hockey rink and drop tickets and discount certificates from above. The most popular kit for these blimps comes from Peck Polymers. Peck has also made many specialty "mascot" blimps, like the "Shark" blimp for the University of Nevada-Las Vegas Runnin' Rebels basketball team.

Perhaps the most prolific and imaginative LTA modeler is Mike Dodd of Norfolk, VA. Mike prefers to make blimps with "alternative" forms of propulsion to move them through the air. Over the years, he has made blimps with flapping wings (ornithopters), flapping tails, rowing oars and twin opposing paddle-tails, to name just a few. He has also experimented with imaginative bag shapes for some of his models.

In a 1993 airshow at the China Lake Naval Air Warfare Center, John Piri gave a demonstration of covert aerial surveillance—inside a

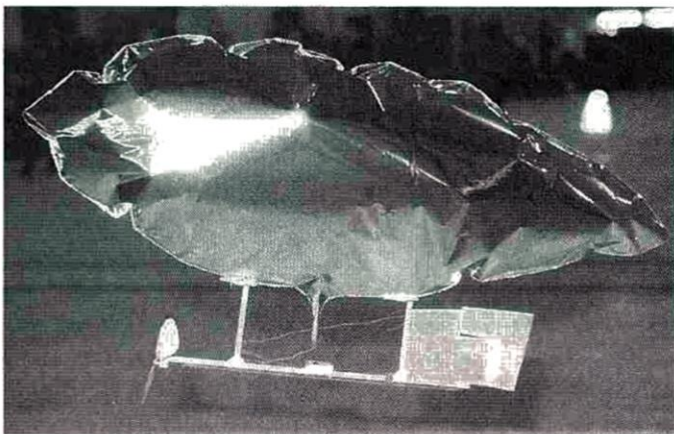


**Connie Katz of Simi Valley, CA, holds husband Jerry's 9-foot-long blimp based on a design by Bill Watson. (Photo by Jerry Katz.)**

hangar! On his 7-foot-long blimp, he combined a sub-miniature video camera from Supercircuits and a stripped-down "Rabbit" video-broadcast system that's normally used to send video signals to several televisions in a home from a single cable input. Using this system, he flew over the heads of the crowd and received the video output at his demonstration booth. Supercircuits also offers a miniature microphone that can be added to its camera transmitter. Because of the silence of the blimp's motors and the sensitivity of the microphone, it would not be difficult to fly up behind people and catch pieces of their conversation—a stealth blimp!

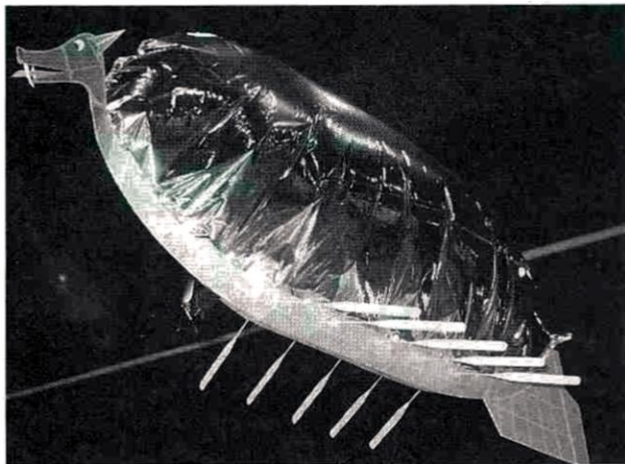
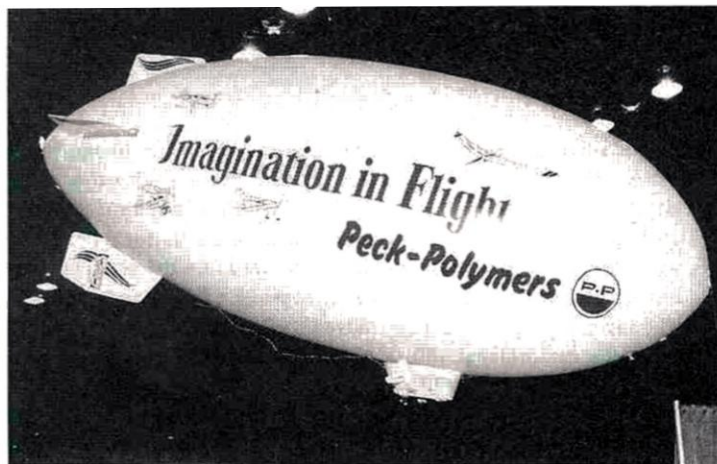
John has kitted a few of his models, and he also designed the R/C blimp kits currently available from S.G. Corporation. You can contact John at West Coast Blimps and Electronics for more information. Check out his web page at [www1.ridgecrest.ca.us/~jpiri/](http://www1.ridgecrest.ca.us/~jpiri/). It has links to many other LTA sites.

John flies at the Jim Stafford Theater in Branson, MO. To entertain the audience between acts, he flies a variety of LTA craft over the crowd, each ship more unusual than the one before. Mike



**The author's "Li'l Red" R/C blimp. By ballasting it just a little heavy so it climbs under power and descends when the motor runs down, it can turn out 15-minute flights with ease.**





**Left: the Peck Polymers 1300 Blimp.** The 13-foot-long bag contains 160 cubic feet of helium—enough to give 90 ounces of lift or 20 ounces beyond the weight of the radio and gondola. A similar blimp once “threw out” the first ball at the Houston Astrodome by dropping it onto the pitcher’s mound! **Right: the author’s Viking Blimp** is just over 9 feet long. The five pairs of oars row back and forth in flight, but propulsion actually comes from a small electric motor just below the keel. The model is currently flying at the Jim Stafford Theater in Branson, MO.

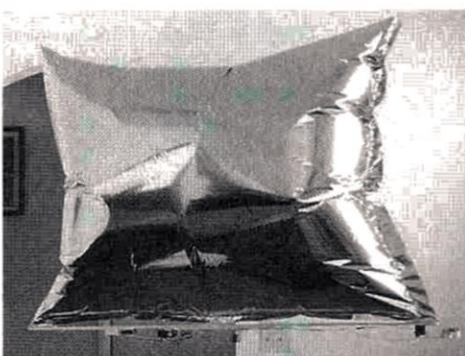
Dodd and I have supplied the theater with unique airships as well. If you want to see daily demonstrations of a variety of R/C model LTA, Branson is the place to go!

Flying models of rigid airships are also possible, though they’re much more of a challenge in manufacturing and logistics. The ships are necessarily much larger just to have the volume to lift the hull. Making an airtight hull is difficult, though you can inflate bags inside the structure like the original rigids, but this requires an even larger model. Also, not every modeler has the room to build and store such a ship or the means to transport it to a flying site. One modeler who has successfully done all this is Jim Fackler. Powered by four geared Kenway motors and a 350mAh battery, his DG 650 is 13 feet long, 26 inches in diameter and weighs 37 ounces (without helium). Plans are available from JF & Associates for \$39 plus \$5 S&H.

Students of Mr. Richard Lenda at Thomas S. Wootton High School in Gaithersburg, MD, have been participating for several years in an FF rubber-powered blimp contest. As a result of their efforts, in 1995, they were selected as the first high school ever allowed to compete in the International Aerial Robotics Competition written about in the March '97 *Model Airplane News*. Because they were a high school team competing against engineering students from MIT and Stanford, they were allowed to build a model controlled by conventional R/C rather than an autonomous computer. Their “Saucer Blimp” was 10 feet in diameter and powered by three electric motors, each pointing in a different direction for full thrust vectoring.

A group of students at the University of Virginia have been working for three years to design and build a solar powered R/C air-

ship called “Dunkin.” The first of three planned blimps of increasing size and complexity, it has already completed its initial test flights. Dunkin is 30 feet long, 13 feet wide, 8 feet tall and weighs 110 pounds (without helium). Three 12V, 17Ah gel-type lead-acid batteries power two AstroFlight® Astro Cobalt 60 electric sport motors, which swing 20-inch pusher props for 15 minutes of flight at maximum thrust of 8 pounds each (though the ship does quite well with less). Dunkin is controlled by a conventional Futaba radio with two heavy-duty servos for each control surface. The project was recently granted a prestigious Lemelson grant, and the students had an 11-foot-long flying model of their next ship, “Aztec,” on display at the Smithsonian Institution in Washington, D.C. Their ultimate ship will be over 80 feet long, completely solar powered and capable of 24-hours-a-day autonomous flight.



**John Piri's R/C House Blimp.** The simplicity of the model is evident in the rectangular bag shape and single-stick balsa keel. (Photo by John Piri.)

LTA modeling has come a long way and more and more people are becoming involved. If you'd like some relaxing flying and some interesting challenges, give lighter-than-air models a try.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 126. †

## Balloon Information and Product Sources

If you would like more information on how to get started with model LTA, contact the following sources for more information.

- **Tony Avak**, 21640 Atalanta St., Lexington Park, MD 20653; (301) 862-4517.
- **Cloud 9 R/C**, 4326 Andes Dr., Fairfax, VA 22030. (\$10 for 1-year subscription).
- **HiLine**, P.O. Box 11558, Goldsboro, NC 27532. (\$1 for catalog).
- **JF & Associates**, 286 Elkhorn Dr., Duarte, CA 91010; (818) 358-7568.
- **Kenway Micro Flight**, P.O. Box 889, Hackettstown, NJ 07840; (908) 850-9571.
- **Peck Polymers**, P.O. Box 710399, Santee, CA 92072-0399; (619) 448-1818. (\$4 for catalog).
- **S. G. Corp.**, P.O. Box 12023, San Diego, CA 92112-2023; (800) 431-9002.
- **Solar Airship Program**, Department of MANE, University of Virginia, Thornton Hall, Charlottesville, VA 22903-7426; (804) 924-4425. Website: [www.virginia.edu/~secap](http://www.virginia.edu/~secap).
- **Supercircuits**, One Supercircuits Plaza, Leander, TX 78641; (800) 335-9777.
- **VL Products**, 7871 Alabama Ave., #16, Canoga Park, CA 91304. (\$1 for catalog).
- **West Coast Blimps and Electronics**, 713 Cottonwood Dr., Ridgecrest, CA 93555; (619) 375-2108. (Send an SASE for catalog.)





# R/C CYBERNEWS

by JIM RYAN

## MODELING ON THE WEB

I WAS INTRIGUED when Larry Marshall approached me about writing the "Cybernews" column. He explained that Bill Griggs had become too busy with his business at Bill Griggs Models, and having shared a booth with Bill and his wife Sonya at Toledo, I could see what he meant. We all hope their business continues to thrive.

The home PC is revolutionizing radio-control modeling. Modeling-related uses of home PCs include Internet discussion groups where information and camaraderie are shared with other modelers; World Wide Web sites that allow you to access data, order products from vendors, or simply catch up on news and product developments; flight simula-

tors that sharpen your rusty skills after a period of inactivity; CAD programs and airfoil plotters that allow you to design better aircraft with less trial and error; and flight-analysis programs that predict the performance of new aircraft with remarkable accuracy.

In the coming months, we'll look at each of these uses in turn, discuss the various products available and offer suggestions for their optimum use. We'll also feature a modeling website in each column. We'll speak in layman's terms, because I'm not a computer expert; like many of you, I was handed a laptop computer at work and essentially taught myself to use it. It's been an interesting experience, to say the least.

### ON-LINE DISCUSSION GROUPS

Why is it important to be on-line? Take a look around your local club. Chances are, it tends to emphasize some particular aspect of radio-control modeling. Perhaps a lot of members are into pylon racing. Or maybe the club has an unusually high number of warbird lovers. Or maybe there's a strong pattern presence. Have you ever wondered how it got that way? Chances are that a small core of members decided that regular sport models just weren't doing it for them, and they wanted to explore racing or scale or precision aerobatics. With time, this small

group learned from its mistakes by sharing tips with each other and, eventually, they became a ready source of information for others who wanted to get in on the act. This was certainly my experience. When I moved to Cincinnati, I'd just finished crashing an overweight P-47 that I spent two years building, and to say I was discouraged would be a gross understatement. But I discovered that my new club had at least half a dozen members actively flying warbirds; not just on special occasions, but every weekend. These fellows had been flying scale models for several years, and they shared their knowledge readily.

The on-line world is a lot like the biggest R/C club in the world. Whatever your area of interest, there's someone who can and will answer your questions. If you want to find out how to glass a model, an experienced builder will walk you through the process. If you're trying to install retractors in your P-47, someone can even tell you how to get the sectional doors to work. If you're trying to build an electric pattern plane, half a dozen people will come forward to recommend the best motor, Ni-Cds and controller and even tell you how to install the servos in that slender fuselage. The point is, there is almost no question you can ask that will go unanswered.

Modelers who are already on-line have grown so accustomed to communicating with other modelers all



Name	URL Address	Description
CompuServe Modelnet	From CIS Desktop, "GO MODELNET"	Modeling forum sorted by sections for specific interests.
America Online	Model Aviation Forum	From AOL desktop, "GO HOBBY CENTRAL" and join "Model Aviation Forum." Modeling forum sorted by sections and live chat rooms for particular subjects.
Tower Hobbies Master List	<a href="http://www.towerhobbies.com/rcwmaster.html">www.towerhobbies.com/rcwmaster.html</a>	Giant listing of links to R/C websites.
"Liszt" Search Engine	<a href="http://www.liszt.com/">http://www.liszt.com/</a>	Search engine with listings for over 71,000 Internet listserve conferences.
Deja News	<a href="http://www.dejanews.com/">http://www.dejanews.com/</a>	Search engine for Usenet newsgroups.
rec.models.rc.air	<a href="http://rec.models.rc.air">rec.models.rc.air</a>	Usenet group for flying R/C models. Mostly general content.
rec.models.rc.helicopter	<a href="http://rec.models.rc.helicopter">rec.models.rc.helicopter</a>	Usenet for rotary-wing discussions. Useful tech content on subjects from beginner to expert.
rec.models.scale	<a href="http://rec.models.scale">rec.models.scale</a>	Usenet for scale modeling, mostly static models, but there's helpful information on paints, finishing techniques, etc.
EFLIGHT!	<a href="mailto:eflight-list@ezonemag.com">eflight-list@ezonemag.com</a>	Listserve for electric flight. Content ranges from gliders to racing to large scale models. Companion website with articles, FAQs, etc.
R/C Soaring Exchange	<a href="mailto:soaring@airage.com">soaring@airage.com</a>	Listserve conference for all forms of soaring, including thermal, slope and electric.
FreeFlight Mailing List	<a href="mailto:mail-list-request@gontpe.apple.com">mail-list-request@gontpe.apple.com</a>	Listserve for free flight and micro R/C discussions.



over the world that we tend to forget that the majority of our colleagues not only aren't participating, they have no idea what's available and how it can help them. In my own case, on-line discussions were the key to my successful entry into electric flight. The first time I ever saw an electric model fly, I was piloting it. This would not have been possible without the information generously offered by friends I met on-line.

ranges from off-topic hangar talk to private conversations of interest to no one but the participants. Some people really enjoy this style of discussion, but I found it wearing after a while. There's no denying there's a club-like atmosphere, and long-time members may even schedule their vacations to meet up and fly together. This can add a whole new dimension to the hobby.

If you'd like to try a commercial on-line service, take one of the free trial-membership diskettes that have been arriving in the mail weekly since you bought your computer (you're probably using them for coasters), slip it into the floppy drive, and follow the sign-up instructions. Once you're connected to the service, you can join CompuServe's Modelnet by clicking the "Go" icon and typing "Modelnet" in the dialog box. For AOL, go to Hobby Central and join the Model Aviation Forum. You'll find that these forums are divided into sections for particular interests like pattern, jets, electric, soaring, etc. You can read as many or as few of the sections as you wish.

If you decide you like CompuServe, I recommend you download an Off-Line Reader (OLR) like NavCIS, OzWin or TapCIS. These allow you to download the daily message traffic and read and reply to messages off-line, thereby saving considerably on connect-

time charges (and avoiding tying up the phone line for hours at a time). AOL relies heavily on live "chat rooms" in which you communicate with other members on-line. Some people enjoy the novelty of live chat, but this style of communication has two main limitations: it requires that people in time zones scattered all over the world be on-line at the same time to talk to each other; and typing proficiency varies widely, and it can be frustrating for both parties when a very fast typist is talking to a very slow one.

Outside the commercial on-line services is the sprawling giant known as the Internet. The beauty of the Internet is that you can access it through any local Internet Service Provider (ISP) or commercial on-line service, and you don't

need dedicated software. You may already have access at work. The Internet offers two general classes of discussion groups; newsgroups, known as Usenets, and listserve conferences.

Usenets are almost universally unmoderated, and members are governed only by their own standards of behavior. Usenets have seen occasional "flame" wars, in which members hurl gratuitous insults at one another, but this seems to be on the wane. The best-known R/C Usenet is **rec.models.rc.air**, but there are others devoted to particular interests like helicopters and scale.

Listserve conferences are becoming increasingly popular because they can be moderated by the owner. Members join at the discretion of the owner, who sets the guidelines for behavior. Some conferences have an easygoing chatty atmosphere, while others are more consistently on topic. Whichever the case may be, members who "flame" their fellow participants can be promptly removed. Since the traffic in listserve conferences comes to you as a series of regular email messages, it's a good idea to use a more sophisticated email reader like Eudora Pro or Pegasus that's capable of filtering the conference traffic into a dedicated mailbox. Otherwise, your personal and business email tends to get buried in the shuffle. Available listserves include Eflight, *Model Airplane News's* own R/C Soaring Exchange and the Free Flight Mailing List. Each conference has its own procedure to subscribe, but it's usually just a matter of sending a message to the correct domain, or address, with the word "subscribe" in the subject line.

This summary is in no way comprehensive, but it should at least give you a notion of what's available. A keyword search on your Web browser will turn up literally thousands of R/C websites, some of them with links to discussion groups. Although I enjoy it, on-line discussion isn't for everyone. Some members prefer to just read without ever posting (a practice known as "lurking"), and others just don't enjoy the style of communication. But there is nowhere else that you can access so much information so quickly.

## CYBERSAMPLER

The World Wide Web harbors a wonderland of aviation images and informa-

(Continued on page 65)



America Online user interface.



CompuServe on-line user interface.

## GETTING WIRED

Now that you're convinced that you should give on-line conferences a try, how do you get started? This depends on which conference group you wish to join. Commercial on-line services like America Online and CompuServe have discussion groups or forums that require you to belong to their service. Fortunately, competition for new subscribers has grown so stiff that the commercial services keep offering sweeter and sweeter deals that include enough free hours to allow you to see whether that particular forum is for you before you ever have to pay a dime. In my experience, the discussion groups offered by the commercial on-line services tend to have a fairly low signal to noise ratio; some of the discussion



(Continued from page 62)

tion—both historical and modern—that can be a real treat to explore. Here's a sampler of just a few of the available sites.



## Aviation Enthusiasts' Corner, Aero-Web

<http://www.aeroweb.brooklyn.cuny.edu/rec/air/air.html>

If you want to locate aircraft museums in a given state, or see the inventory of aircraft at a museum, or locate the nearest example of a military aircraft of interest, visit this site. Airshows are indexed by location, performers and month. Want to refresh your memory on how the Wright brothers solved the problem of manned flight? See their photos and words here.



## National Air and Space Museum, Smithsonian Institution

<http://www.nasm.edu/NASMPage.html>

Take a leisurely tour of the Museum's notable exhibits, which can only be described in superlatives. See links to an ocean of online, data-rich resources relating to air and space.

## Russian Aviation Museum

<http://www.ctrl-c.liu.se/misc/ram/>

If Russian aircraft are your interest, you will find interesting articles and photos here. Aircraft are organized by alphabet, designer, design bureau, year of first flight, NATO designation and prewar designations. Much to see.

## National Aviation Museum of Canada

<http://www.aviation.nmstc.ca/e-home.htm>

This Canadian site covers a great many aircraft with excellent photos, research notes and a glossary of specialized terms. We highly recommend it.



## Dryden Research Aircraft Photo Archive

<http://www.dfrc.nasa.gov/PhotoServer/>

This is an absolutely must-see site. It contains digitized photos of many of the unique research aircraft flown at what is now known as the NASA Dryden Flight Research Center at Edwards, California. The images date from the '40s to the present, and multiple resolutions are available. Don't forget to check out the NASA Dryden homepage and other NASA links.

## Air Force Link

<http://www.dtic.mil:80/airforcelink/photos>

A broad range of public-domain images of Air Force aircraft and current operations file photos are available here.



## Nurflugel Homepage

<http://www.teleport.com/~dbullard/nurflugel>

The photos, drawings and discussion of the Horton, Lippisch and Northrop flying wings on this site are captivating.

## The Military Aircraft Archive

<http://www.rpi.edu/~harkin/airpics.html>

Here's the place to see great photos of WW I and WW II aircraft and helicopters, with basic specs included. Great links.

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Just fill out the coupon below, pop it in an envelope addressed to Horizon, add a stamp and we'll return something that'll probably make your decision a little easier.

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☐ **F400.** Four channels of genuine JR quality at a genuinely affordable price.

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☐ **XP8103.** Innovative graphics and logical screen progressions make it easy to harness the impressive computer power of this ten-model-storage radio. Widely hailed as "the eight channel that takes the mystery out of programming," the 8103 complements the skills of even the most demanding pilots.

☐ **PCM10Sx.** The undisputed champ for ease-of-programming among pro-class radios. Its touch-screen operation and superb displays make even the most sophisticated setups so simple that many owners rarely consult their manuals! The ten channel PCM10Sx. It's the pro-class JR for the enthusiast who wants the very best.

NAME

ADDRESS

CITY

STATE

ZIP

FAVORITE R/C DEALER

YEARS IN R/C

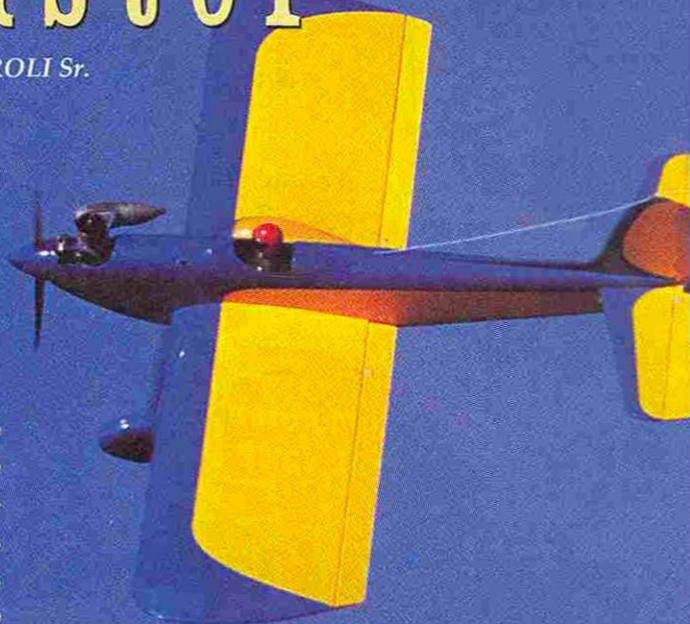


*R/C replica of  
Harry Williamson's  
1951 Ukie*

# The Ringmaster

by NICK ZIROLI Sr.

**T**HERE WERE many attractive sport and stunt control-line models designed in the late 1940s and 1950s, and I've built many of them. Kits back then, though, were priced from \$1.50 to \$4 and were generally out of my financial reach, so this made scratch-building from magazine plans my only alternative. Full-size plans were inexpensive and, in many cases, were included in the magazines featuring the model. If the full-size plans were not included, often, the ribs and formers were. Besides, I was always too impatient to order and wait for the plans, and they cost money that could be better spent on balsa and other supplies. My drawing skills were developed at a rather young age while enlarging many of these magazine plans.





The October 1951 issue of *Model Airplane News* included a good-looking control-line stunt model, designed by Harry Williamson, called the Ringmaster. Today, this is a confusing name because a few months after Williamson's article was published, Sterling Models

brought out their now famous control-line model, the Ring Master (two words). The model I am presenting here in R/C form is a representation of the earlier Williamson Ringmaster (one word), which was also republished by *Model Airplane News* as a Golden Oldie in the April 1980 issue.

### THE NEW RINGMASTER

My brother Bo had built the Williamson Ringmaster when it had first come out and suggested it as a good choice when I told him I wanted to adapt an old-time control-line model to R/C. Just as in the old days, I enlarged the magazine plans. I enlarged the wingspan to 54 inches instead of the original 42-inch span, an increase of about 30 percent. I added strip ailerons to my R/C version, though the original Ringmaster did not have stunt flaps on the wings. I chose about 625 square inches of wing area so the model could be powered by one of the many .40- to .50-size engines currently available. Even though I changed some of the model's proportions to make it more suitable for R/C, the model remains unmistakably a Ringmaster.

### CONSTRUCTION

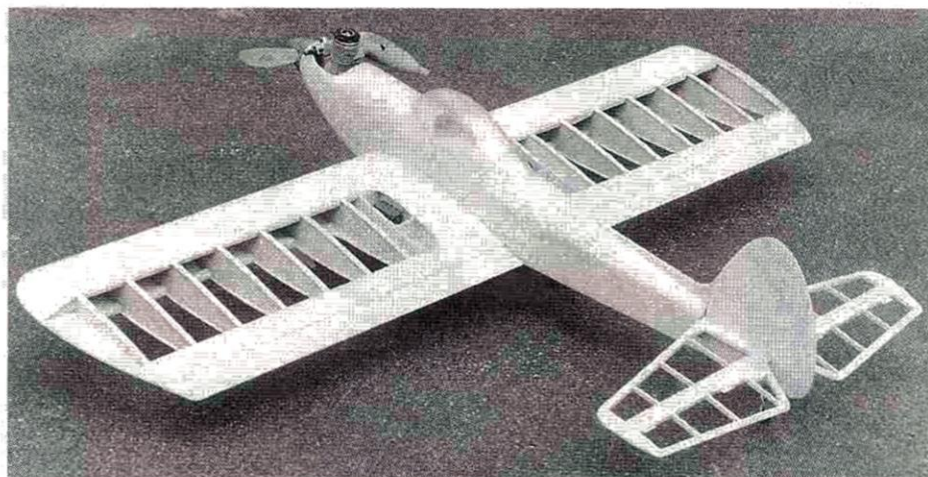
The Ringmaster's construction is rather conventional, though maybe a little more overbuilt than some of the newer super aerobatic designs. Begin by building the wing, as this is the most time consuming part of the project. I like to get the wing underway first and then take breaks from it to build the fuselage and the tail surfaces. The wing can be built either in one piece or in two halves that are then joined together later. I prefer to build it in one piece. I use Zap\* CA for most of the construction.

Tack-glue the 1/2-inch-square rib shim into place over the plan where shown and pin the 1/4x1/2-inch bottom spar to the plan.

Join the spars in the center between the W-1 ribs with a 1/4x1/2-inch doubler, then add the remaining ribs along with the 1/8-inch-thick plywood joiners WJ-1 and WJ-2. Install the top spar followed by the 1/4-inch-square leading and trailing edges. Now sand the LE to conform to the shape of the ribs.

If you plan to install two aileron servos (one in each wing panel), be sure to

include ribs W-2A and W-1A to support the plywood servo-mount rails. Since W-1A sets the servo rail locations, make certain that it suits the servos that are being used. Lay the servo over the plan, and modify the rail location on W-1A so the servo output shaft will protrude through the surface of the wing. The servo arm will be outside of the wing after the wing has been covered. Glue one side of the TE



The bare bones of the new Ringmaster show its simple lines and conventional construction. The flat, symmetrical airfoil wing is reminiscent of the original 1951 Williamson control-line design.

### BILL OF MATERIALS

QUANTITY	SIZE	USE
<b>Balsa</b>		
4 sheets	1/16x4x36 in.	LE covering
4 sheets	1/16x3x36 in.	TE and center section covering
4 sheets	3/32x4x36 in.	Ribs, wingtips and fuse bottom
4 sheets	1/8x3x36 in.	Fuse sides, formers and planking
2 sheets	1/4x4x36 in.	Stabilizer and rudder
3 strips	1/4x1/4x36 in.	LE, TE and stringers
2 strips	1/4x3/8x36 in.	For built-up stabilizer
5 strips	1/4x1/2x36 in.	Wing spars and stabilizer
2 pieces	5/16x1 1/4x36 in.	Tapered ailerons
1 piece	3/4x3x6 in.	Bottom nose block
<b>Plywood</b>		
1 piece	1/16x6x18 in.	Doublers
1 piece	1/8x6x12 in.	F-2, WJ-1 and WJ-2 wing joiners and misc.
1 piece	1/4x6x6 in.	F-1, LG-1 and servo rails
<b>Misc.</b>		
1 piece	5/32-in.-dia. music wire	landing gear

Accessory set containing vacuum-formed plastic cowl, canopy and wheel pants is available from Nick Zirolì Plans, 2231-23 Fifth Ave., Ronkonkoma, NY 11779; (516) 467-4765; price \$19.95 plus \$4 UPS in the continental USA.

### SPECIFICATIONS

**Model:** Ringmaster

**Type:** R/C sport aerobatic replica

**Wingspan:** 54 in.

**Wing area:** 625 sq. in.

**Weight:** 74 oz.

**Wing loading:** 17 oz. per sq. ft.

**Length:** 39 in.

**Airfoil:** symmetrical

**Engine req'd:** .40 - .50 2-stroke, .45 - .60 4-stroke

**Engine used:** Estes MDS .40

**Radio req'd:** 4-channel (aileron, rudder, elevator and throttle)

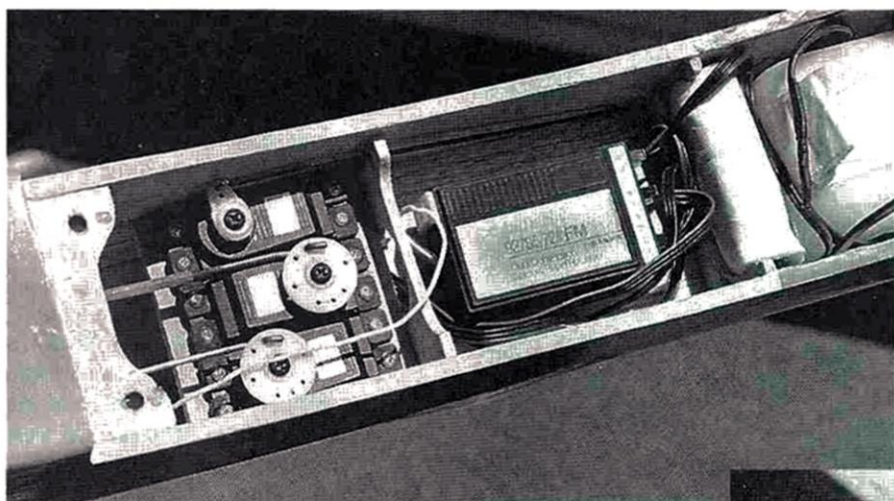
**Radio used:** Airtronics Infinity

**Features:** designed by Nick Zirolì Sr., the new Ringmaster is built of conventional balsa and plywood and has a flat, (no dihedral) symmetrical airfoil wing. The stabilizer and elevator are built up, and the fin and rudder are made from 1/4-inch sheet balsa. A vacuum-formed engine cowl, canopy and wheel pants are available from Nick Zirolì Plans.

**Comments:** the Ringmaster is a 30-percent-enlarged, R/C version of the 1951 control-line Ringmaster designed by Harry Williamson that was published in the October 1951 issue of *Model Airplane News*.



## THE RINGMASTER



Above: the fuselage is tight, but there is room for most radios.

sheeting into place. When the glue has dried, glue the other TE sheeting into place, and then pin or clamp the entire TE to a flat surface or straightedge. I have found that a length of 1-inch-square aluminum tube is good for this purpose. Now glue the 1/4x1/2-inch filler block inside the TE between the two W-1 ribs.

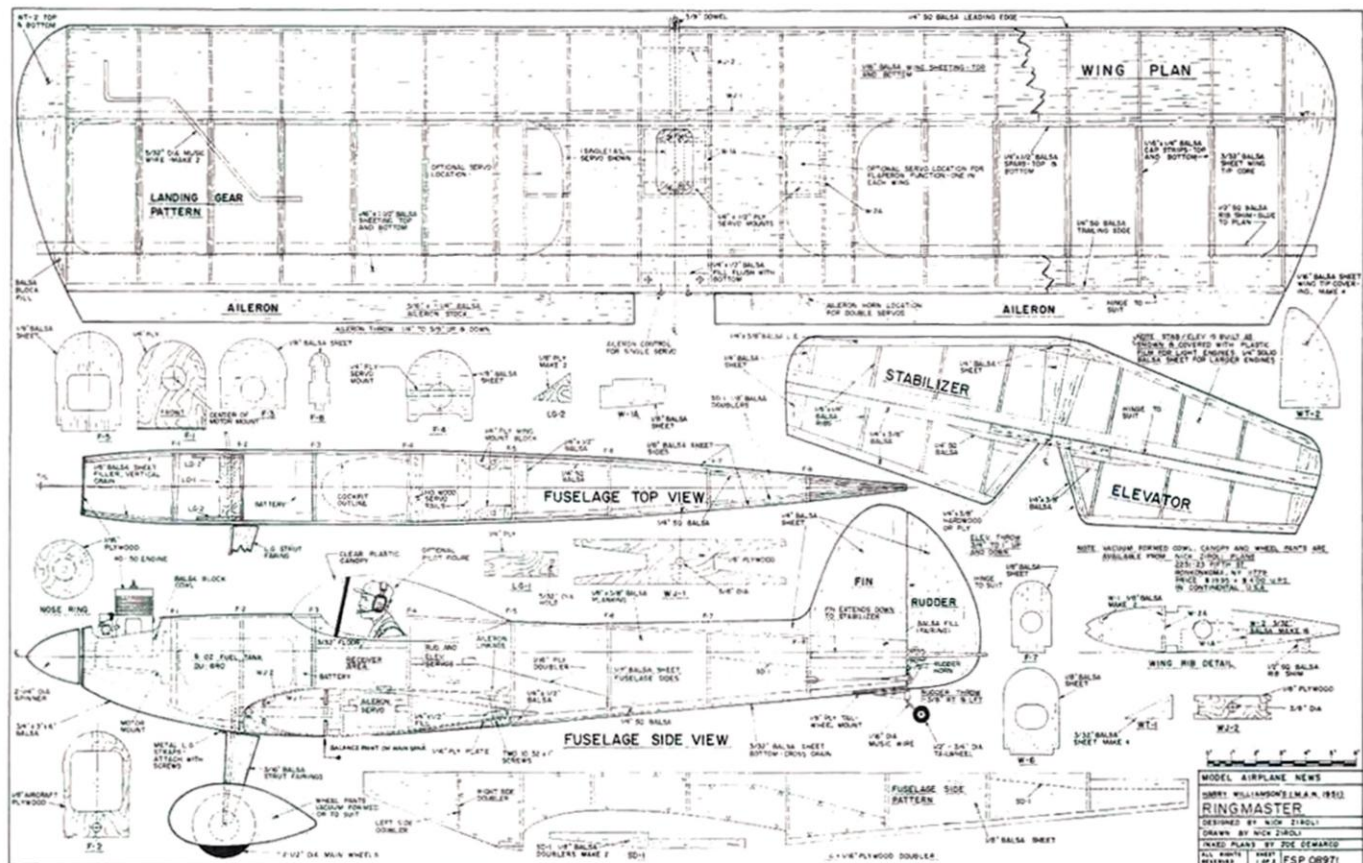
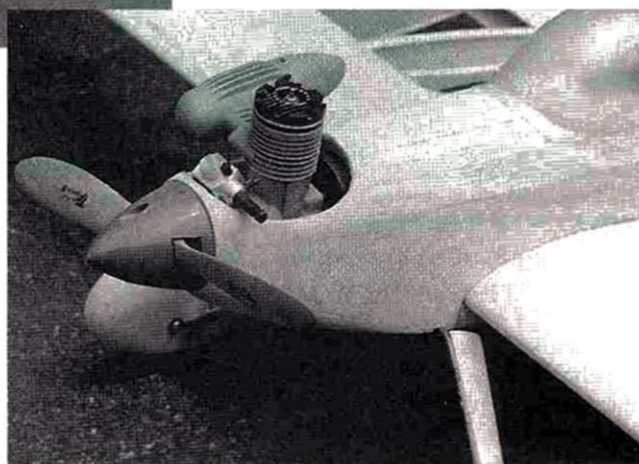
Cover the LE with 1/16x4-inch balsa sheeting. Place the aft edge of the LE sheeting 1/8 to 3/16 inch forward of the main spar's aft edge. This makes for an even

joint between the LE sheeting and the fronts of the capstrips. Cover the center section of the wing with 1/16-inch balsa sheeting. If two aileron servos are to be used, extend the sheeting out past the servos, and cut openings in the sheeting to accommodate the installation of

the servos. Though not necessary, I like to radius the corners of the sheeting between the ribs and the leading and trailing edges. Radius corners not only make the structure look better, they add strength and keep the covering from wrinkling in the corners.

Add the wingtips, W-T1, W-T2 covering pieces as well as the rib capstrips. To prepare the wing for covering, shape the LE and block sand all the joints. Next, fit and trial hinge the ailerons into place but don't

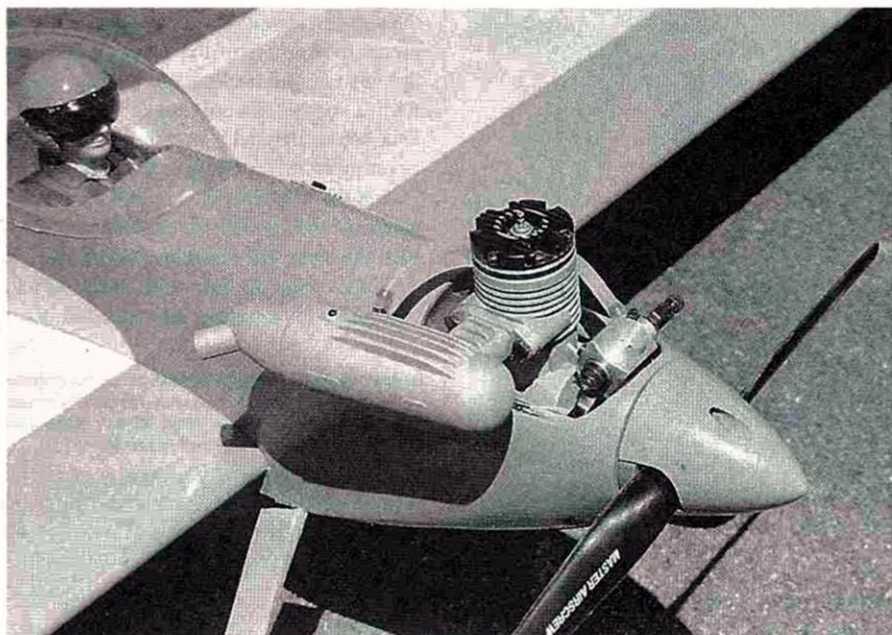
Below: the prototype includes a wood engine cowl section, but a vacuum-formed engine cowl is available from Nick Zirolli. Note the strip planking on the upper fuselage.



To order the full-size plans (FSP08971), see Pilots' Mart page 113.



## THE RINGMASTER



An Estes MDS .40 is used for power. The engine is a good match for the Ringmaster, and performance is strong and consistent.

permanently install the aileron hinges until the surfaces have been covered. Cut a hole at the center of the LE for the wing-mount dowel. File the hole to shape until it lines up with the holes in WJ-1 and WJ-2. Epoxy the dowel into place leaving about  $\frac{3}{8}$  inch of the dowel protruding from the LE. Now drill two  $\frac{1}{8}$ -inch-diameter holes through the wing where the wing hold-down bolts will be installed.

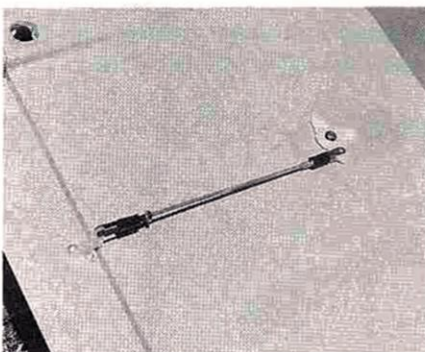
### FUSELAGE

Begin the fuselage by gluing the plywood doublers to the balsa sides. As always, be sure to make a left and a right side. Note that the right side doubler is a little shorter than the left. This builds the correct amount of right thrust into the firewall. Add the  $\frac{1}{4}$ -inch-square bottom corner

stringers and the stabilizer doublers SD-1. Mark the locations of all the formers on the inside of the fuselage sides, then glue into place formers F-2, F-3 and F-4 on one of the sides. Be sure all the formers are square, 90 degrees, to the side. Glue the other fuselage side to the formers, and make sure that the top edges of both sides line up with each other when viewed from the side. Pull the sides together at the tail and glue. Add the rest of the formers as well as the firewall. I like to bolt the engine to the mount and install the engine mount on the firewall (with 4-40 bolts and blind-nuts) before gluing the firewall into place. Epoxy the  $\frac{1}{4}$ x1-inch plywood landing-gear mount and wing-mount blocks into place. Fit the wing to the fuselage, and adjust the hole in former F-2 so the dowel is a tight

fit when the wing is seated properly on the fuselage. When satisfied with the fit and the wing is square to the fuselage, drill through the  $\frac{1}{8}$ -inch holes in the wing and into the wing-mount blocks. Redrill the holes in the wing-mount blocks with a  $\frac{5}{32}$ -inch drill, and then enlarge the holes in the wing with a  $\frac{3}{16}$ -inch drill. Try to drill the holes square to the bottom surface of the wing so the heads of the hold-down bolts will sit flat on the wing's surface. Tap the holes in the wing hold-down blocks with a 10-32 tap. Make and install a  $\frac{1}{16}$ -inch-thick plywood plate to go on the outside of the wing to strengthen the wing where the mount bolts pass through it. Remount the wing, and check that everything is still square and that the wing fits properly, then remove. Glue the cockpit floor into place and install the  $\frac{1}{4}$ -inch plywood servo-mount rails.

Bend the landing gear to shape from  $\frac{5}{32}$ -inch diameter music wire. Epoxy a  $\frac{1}{8}$ x $\frac{5}{16}$ -inch plywood strip along each edge of the landing-gear-mount block to form a slot for the gear wire to fit into. Epoxy a  $\frac{1}{8}$ -inch-square plywood spacer on one side



I used dual aileron servos so I could use the ailerons as flaps and mix them with the elevator.

## FLIGHT PERFORMANCE

### • Takeoff and landing

Powered by the Estes MDS .40 engine, the Ringmaster has more than enough power

and performance. During takeoff, the relatively long tail moment keeps everything straight, and only a slight amount of rudder is required to keep everything lined up. Climb-out is effortless, and the model gets up on step quickly. For landings, the model requires a little power as the thick, symmetrical wing produces a fairly high sink rate on final. Rollout is like that of any other sport tail dragger model.

### • Low-speed performance

The Ringmaster flies very well at slower speeds, and control remains good. With the ailerons/flaps coupled to the elevator, a fair amount of lift is generated, and response remains positive. Flown at moderate speeds, the model has no bad habits.

### • High-speed performance

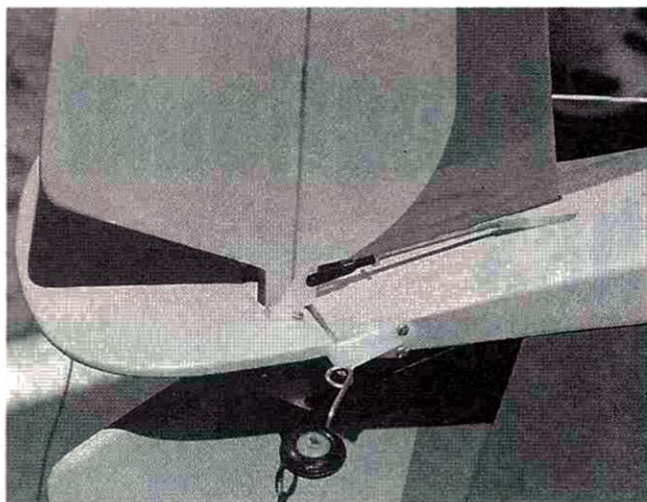
The Ringmaster is a good all-around sport model, and at high speeds, it tracks and flies smoothly. Control response is very good if set up with the control throws shown on the plans. No trim changes are required.

### • Aerobatics

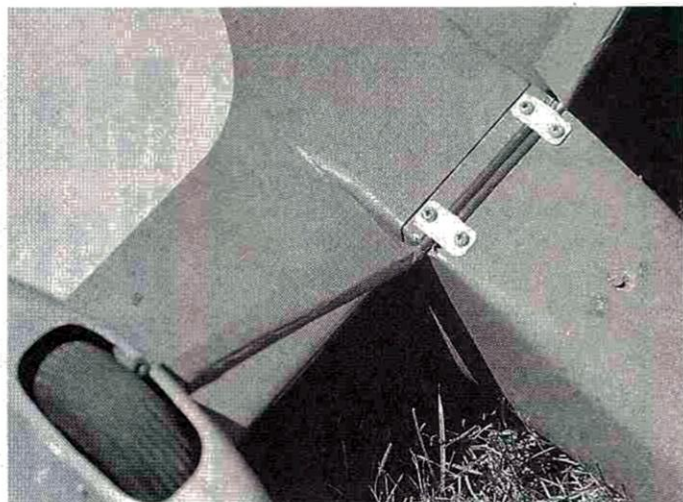
The solid construction and moderate wing loading make the Ringmaster a very nice aerobatic performer. It is not an unlimited aerobatic machine; I did not design it that way. The symmetrical airfoil and no dihedral wing platform give quick response to control inputs. Inverted flight requires a slight amount of down-elevator. If you use dual aileron servos and have a computer radio like my Airtronics Infinity, which allows elevator-to-flap mixing and flaperon-wing mixing (ailerons act as flaps and spoilers), the aerobatic flight performance of the model will be greatly tightened up.







Nothing unusual here: the tail control linkage is simple and straightforward.



5/32-inch diameter music wire is used for the landing gear, and it fits into a slot in the bottom of the fuselage. Metal straps hold the gear in place.

and in front of former F-2 and a 1/8x1/4-inch spacer in front of former F-2 on the other side. Now insert the landing-gear wire, and add the front gusset pieces LG-2 that lock the gear in place. Make thin aluminum or steel straps, and mount them with 1/2-inch-long sheet-metal screws to hold the landing gear in place. Cut to shape, and install the 3/16-inch balsa landing-gear fairings. I grooved the front of the fairings and glued them to the landing gear with Pacer Technology all-purpose Zap-a-Dap-a-Goo adhesive.

Plank the top of the fuselage from the firewall to former F-8 with 1/8x3/8-inch balsa strips. Install the servos and pushrods, and then cover the bottom of the fuselage with cross-grain 3/32-inch balsa. The plans show an all balsa cowl, but I have since made a vacuum-formed cowl to save some weight and time. The cowl, wheel pants and a canopy are available from Nick Ziroli Plans\*.

## THE TAIL

Build up the stabilizer over the plan, or cut it from solid 1/4-inch balsa sheet. Cover and hinge the surfaces before installing it on the fuselage. The fin and rudder are made from 1/4-inch sheet balsa. The fin extends down to the top of the stabilizer. Make the fin fairings by first tack gluing a piece of 1/4-inch balsa in the stabilizer saddle flush with the top of the fuselage. Add another piece of 1/4-inch balsa to act as a spacer for the fin, but make it even with the top of the fairing blocks. Tack glue the filler blocks to each side of the fin spacer, then carve and sand the fairing blocks to shape. Now

remove the spacer and filler blocks.

When I cover a model with plastic film—in this case, Coverite\* Black Baron—I prefer to cover the fuselage, stabilizer, fin and fairing blocks separately and then assemble all the parts. Once all the parts of the model have been covered, you can start final assembly.

## FINAL ASSEMBLY

Install the engine and the fuel tank. For my prototype, I used the Russian-made MDS .40 available from Estes Industries\*. I must say I have been very

setup allows me to use the ailerons as flaps and to mix flaps with the elevator (up elevator, down flaps) for increased lift and tighter turns. Down elevator brings the flaps up like spoilers.

The Ringmaster should be balanced within 1/4 inch of the position shown on the plans. If not, add weight to the nose or tail until it is. My model did not require any balance weight. Set the model up with the control throws indicated on the plans, and be sure that none are reversed. I think you will like the flight performance. The Ringmaster handles very well on the



The new Ringmaster all dressed up and ready to go. The 30-percent enlarged, R/C conversion of the original Williamson 1951 control-line model is a real pleasure to build and fly.

pleased with its performance. Room is at a premium in the fuselage, so I used a Du-Bro\* 8-ounce fuel tank and placed a flat Rx battery pack positioned vertically behind it. The Rx is strapped to the bottom of the cockpit floor. I used an Airtronics\* Infinity radio and two servos in the wing (one for each aileron). This

ground and produces nice straight-line takeoffs. In the air, it is smooth and predictable with no bad habits. I hope you will feel the project was worthwhile and enjoy flying your Ringmaster.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 126.



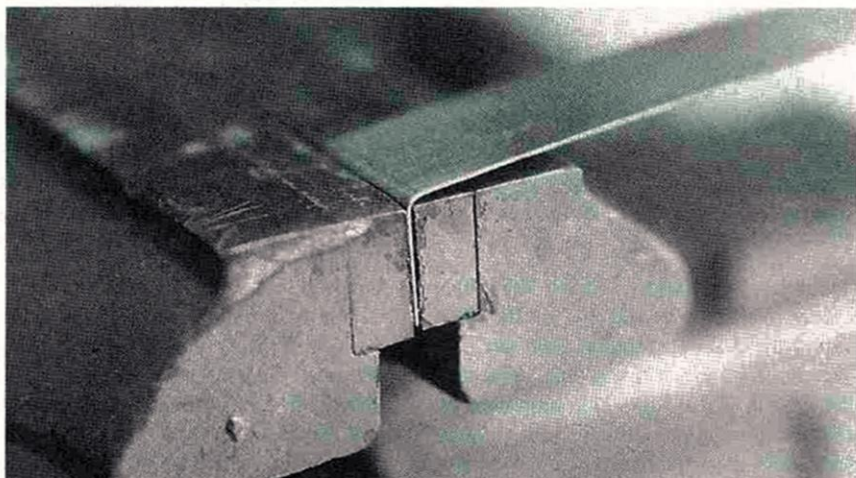
An easy installation that's a perfect fit

# Make Functional Hatches

by BRIAN BECK

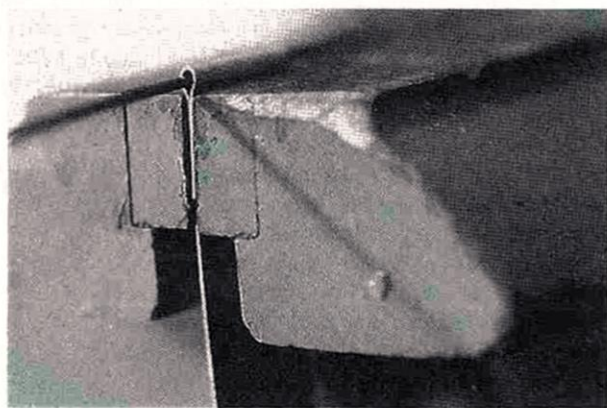
A common method of reproducing

piano-type hinges for models has been to simply bend a piece of flat brass stock around a length of small-diameter music wire. The resulting assembly is then sectioned into small segments that form the individual hinge tabs. While this is probably the best method with which to reproduce these details, actually building the operating hatch is the challenging part. Now I may be slow to catch on, but I've found it quite difficult to attach the finished hinge to the hatch and then to the structure. My old method was quite tedious, and the resulting fit and finish always seemed mediocre at best. Recently, when I was considering the design of an access panel on a cowl, the solution dawned on me. Why not make the finished, working hatch as an assembly, cut out the appropriate-size opening in the model and glue it in place as one unit? I don't know why I didn't see this simple solution before. I wouldn't be surprised if it has been used by others; nonetheless, I've never run across this approach.



PHOTOS BY BRIAN BECK

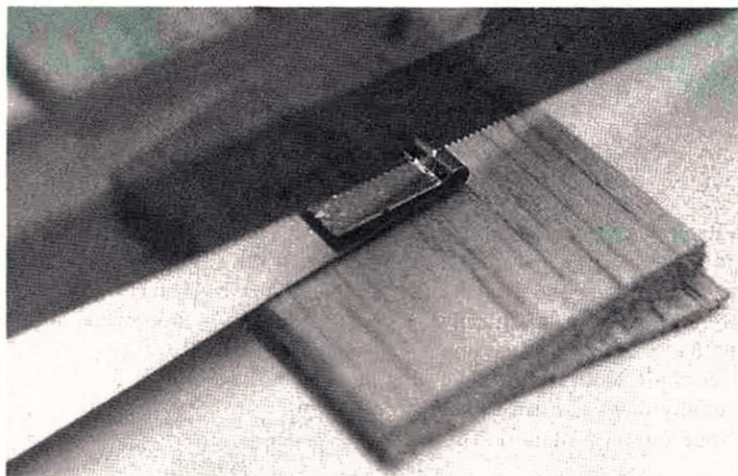
**1** The actual hinge is built with thin, flat, brass stock and music wire of the appropriate size for your application. Make a 90-degree bend in the flat brass stock while it's clamped in a vise. Remove it, and continue the bend to approximately 120 degrees. These bends can usually be made with your fingers (if not, then the brass stock is too thick). The angle isn't critical; I completed this bend using my thumb and index finger.



**2** Slip a long piece of music wire into the groove, and

clamp it in the vise again, this time with the music wire just above the top of the jaws of the vise. This is the critical part. To have a well-formed hinge pivot, the brass must be compressed tightly around the music-wire pin while it's being formed.

It may seem too tight now, but when the jaws are loosened, the brass hinge will open a little. This provides the close tolerance you're looking for. Cut or grind the hinge tabs to whatever length you need for your application ( $\frac{3}{16}$  to  $\frac{1}{4}$  inch will generally suffice). Section the hinge into tabs (usually  $\frac{1}{8}$ -inch wide looks about right).



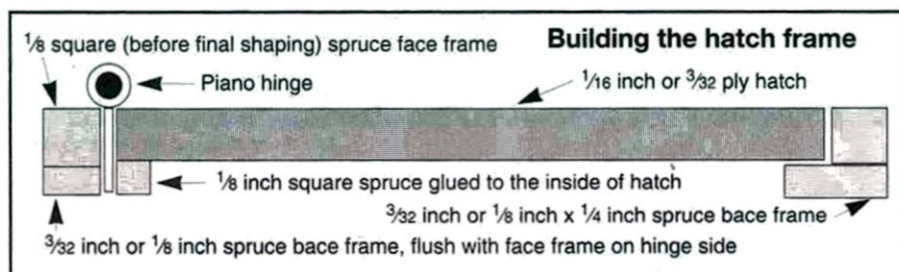
**3** A well-used razor saw works well to cut these tabs. (There is no quicker way to dull a new saw than to cut brass.) Determine the number of tabs you need for the finished length hinge for your application, and repeat the process. Once you determine the finished length of the hinge, cut the music-wire pin to the proper length, and slide on as many tabs as necessary. Make sure to leave a small amount of the wire pin exposed on both ends of the hinge. Roughen the ends with sandpaper, and put a small dot of 5-minute epoxy on the tips of the pin.



**4** To make the hatch frame, I use whatever spruce sticks I have on hand. For the example shown in the photos, I used  $\frac{1}{8}$ -inch square spruce for the outside face frame and  $\frac{1}{8} \times \frac{1}{4}$ -inch stock for the inside base frame. Choose whichever stock sizes are appropriate for your application. The base frame must be slightly larger than the face frame stock in one dimension (see drawing).

The first step is to measure and cut the blank for the actual door.

line, cut pieces for the base and face frames that are slightly longer than the hatch edge. Leaving approximately  $\frac{3}{32}$  inch of the frame exposed, use CA to glue the face-frame stock to the base-frame stock. This detail gives the hatch a surface to close against, and it provides a tight fit that allows the closed door to follow the contour of the model's surface. Repeat this for the side of the frame opposite the hinge line except, this time, trim the assembled base/face frames to a



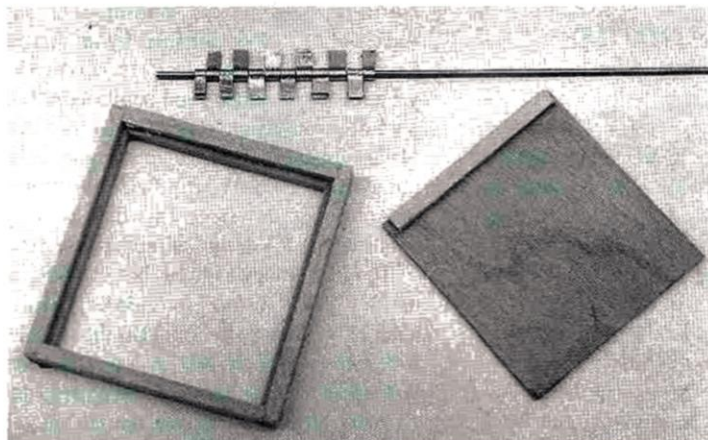
Shape the perimeter of this piece to the exact finished size. This is important, as the frame is fit to the door. Glue a piece of  $\frac{1}{8}$ -inch square stock to the bottom side of the door on the hinge side. This gives you the necessary surface area on which to glue the hinge tabs.

Starting with the two sides of the frame perpendicular to the hinge

length just a fraction larger than the edge of the door. This provides the tiny clearance required for proper operation. The base/face frame assembly is the same on the hinge side, except there is no space on the inside of the frame, as the hinge itself is there.

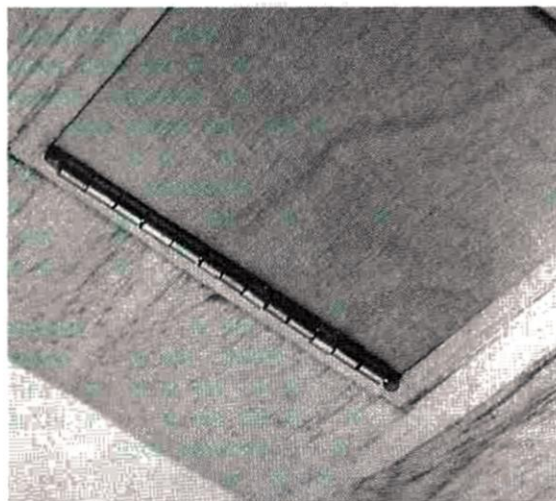
Using the door as a template of sorts, glue together the hinge side of the frame and the sides perpendicular to it. To fit the final piece of the frame assembly (the side opposite the hinged side), set the door into the frame assembly, and slide the hinge in between the door and the frame; this is the

key to a tight-fitting hatch assembly. Leave a tiny clearance space between the perimeter of the door and the face frame. Final trim the last piece of the frame, and glue it into place. Do not glue the hinge into place at this time.



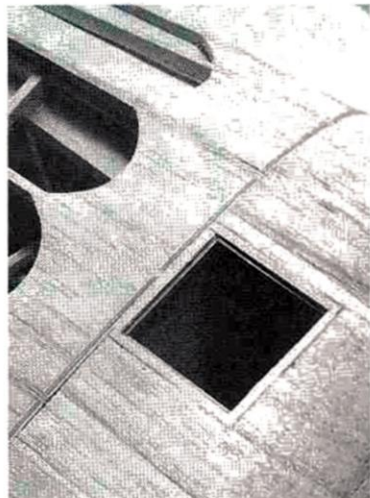
**5** Sand the outside edges of the frame assembly so that the face and base frames are the same outside dimension. At this point, the frame will probably be higher than the door. This is what you want so that you can contour the frame into the surrounding surface. Just remember when you finally glue the assembly in the airframe, you must leave the frame protruding slightly above the surrounding structure;

otherwise the door will be recessed below the surface.



**6** Lay out the hatch location by tracing around the outside of the frame assembly. If you're installing in/using a solid surface, such as a balsa-block cowl, cut out the opening and dry-fit the frame. If your installation is partially in an open area of the model, you need to take in account the surrounding structure. Careful planing/planing before making the frame

assembly makes the final installation much easier. Just remember that while this hatch assembly is sturdy, it isn't designed to replace major structural members. Don't cut into major pieces, such as a fuselage longeron or wing spar. Once the frame has been dry-fit into the airframe, remove it, and carefully wick a coating of thin oil onto the hinge pin.

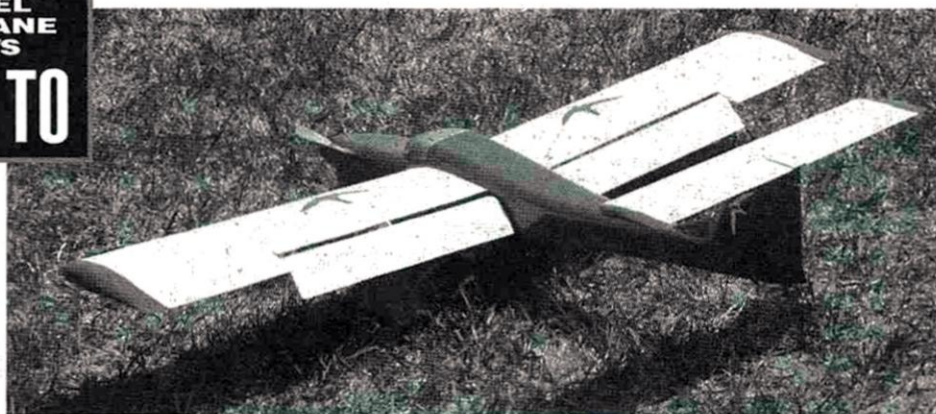


**7** Rough-up the hinge tabs, and dry-fit the entire hatch assembly. Carefully glue the hinge to the assembly using CA, and remember to glue one tab to the frame, the next one to the door and so on. Design and install a latch, and you're finished.

Once you've made one of these, you'll see just how simple it actually is to add this scale-like detail to most any model. With a little imagination, you should be able to adapt this method to most any hatch, be it curved, flat, or even one with multiple doors that close against one another. Mine is actually used in a reproduction of Henry Struck's 1939 Record Hound old-timer. It serves as an access panel to the ignition engine's needle valve and fuel tank. Try it; it's even easier than it looks. +



by ANDY LENNON



The Swift showing off its large flaps.

# More on Slotted Flap Design

Construction,  
activation  
and benefits

**T**HE AUTHOR'S DESIGN and construction articles in *Model Airplane News* have one objective: to improve the performance and looks of model airplanes so as to be comparable to today's sleek, high-performance, home-built, full-scale aircraft—such as the Lancairs, Glasairs and the record-breaking Nemesis.

The following suggestions have been offered: moderately higher wing loadings; slotted flaps to provide slow landings and short takeoffs; close attention to drag-reduction and airfoil selection; sensible power loadings; good propeller selection; stressed-skin structures for sturdy, but light construction; and control-surface mass balancing for flutter prevention.

These were incorporated in the author's design the Swift (*Model Airplane News*, September '93) and its performance has proven their validity and effectiveness.

The major feature of the Swift's design was the use of slotted flaps whose chord is 30 percent of the wing's chord and with substantially extended slot-lip locations, chordwise.

These are not a recent development; they were described in NACA Report 808 published in May 1941—over 55 years ago! Extended, these flaps come close to

doubling the lift coefficient of the wing's flapped area.

One of the Swift's pleasing flying characteristics is that, on throttling back and lowering full-flaps, there is no nose-up or down pitch; the model's attitude does not change, but the airspeed reduction is very evident.

NACA was mentioned above. The National Advisory Committee for Aeronautics was established by an Act of Congress on March 3, 1916. Over the years, it has developed and published a vast pool of aerodynamic research that has been of inestimable value to both designers and the aviation industry worldwide. With due regard for scale-effect, this data is fully applicable to the design of model aircraft.

To ignore this wealth of data in trying to develop "new" features for models is equivalent to an attempt to "reinvent the wheel." It has been done by NACA—and done far better than any one person could hope to do!

Wing slots act like the nozzle on the familiar garden hose. Nozzle off, the water pours out in a thick sluggish stream. Nozzle on and adjusted to a pencil-thin stream, the water jets out at high speed and arcs through the air for a surprising distance before ground contact.

Air pressure on the wing's underside is generated by the aircraft's forward speed, and it forces air through the slot at higher velocity in a slightly downward direction over the extended flaps' upper surface.

This prevents the flap from stalling (Coanda Effect) and increases its lift. This, along with the increase in wing area as the flap is extended provides healthy added lift—without the high drag that split air or plain flaps generate.

Lowering slotted flaps to 20-degrees deflection for takeoff reduces both takeoff speed and length. The Swift, flaps half-extended, leaps into the air in under 10 feet of ground run and climbs steeply.

To detail flap design, Fig. 1 shows a

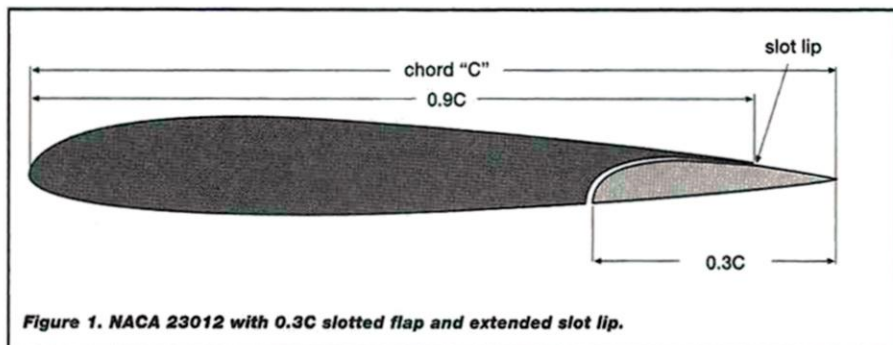


Figure 1. NACA 23012 with 0.3C slotted flap and extended slot lip.



## SLOTTED FLAP DESIGN

0.3c flap in a NACA 23012 airfoil, with the slot-lip located at 0.9c as in NACA Report 808. This airfoil is thick towards its trailing edge. This permits the 0.9c slot-lip along with adequate flap thickness and a good flap/airfoil section.

NACA 23012 dates from the '30s. Airfoils recently developed for good performance at the low Reynolds numbers of model flight, such as the Eppler E197, are thinner toward the rear. With a slot-lip at 0.9c, the flap would be too thin for adequate strength and of poor airfoil section.

The solution is to advance the slot-lip, as in Fig. 2, providing a flap of adequate thickness, at least equal to the parent airfoil's thickness in percent of its chord. The E197 airfoil is 13.42 percent in thickness/chord ratio.

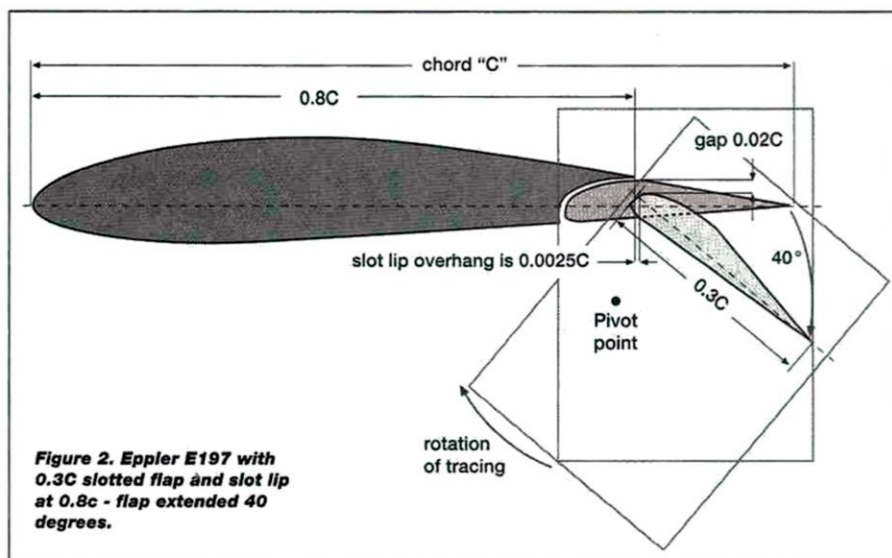


Figure 2. Eppler E197 with 0.3C slotted flap and slot lip at 0.8c - flap extended 40 degrees.

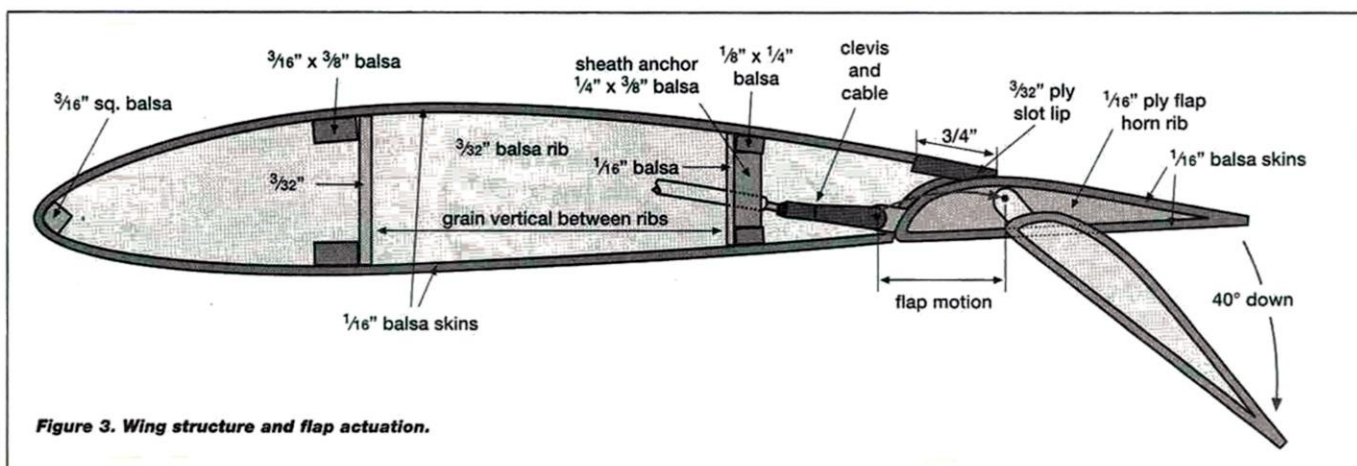


Figure 3. Wing structure and flap actuation.

Fig. 2 shows the E197 airfoil with 0.3c flap and slot-lip at 0.8 chord, with the flap deployed 40 degrees.

Note that the slot-lip extends beyond the flap leading edge by 0.0025c, and has a vertical gap between flap and slot lip of

0.02c. These dimensions are important for best results.

The next step is to locate that important pivot point about which the flap will rotate from its "up" position to the 40-degree deflected position, while preserving the

exact overhang and gap. It is not difficult.

On a small piece of onion-skin paper, tracing paper or drafting film, trace the exact outline and chord line of the flap as in flight.

Place this tracing exactly over the flap in the "up" position in Fig. 2. By trial and

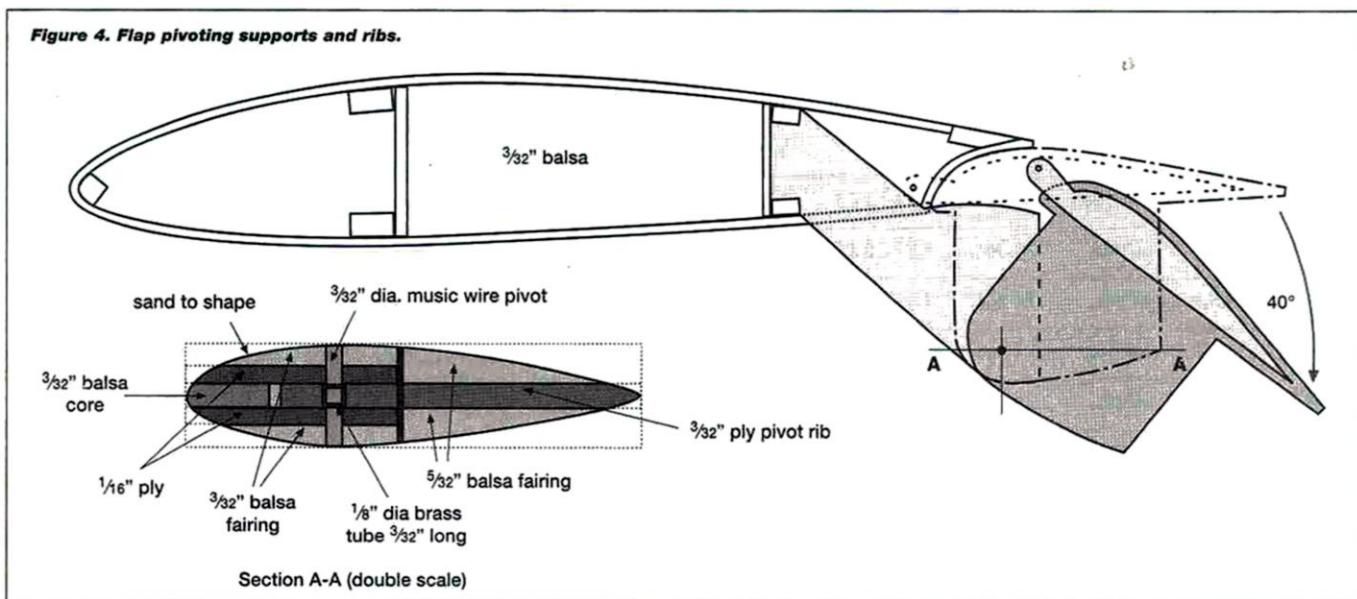
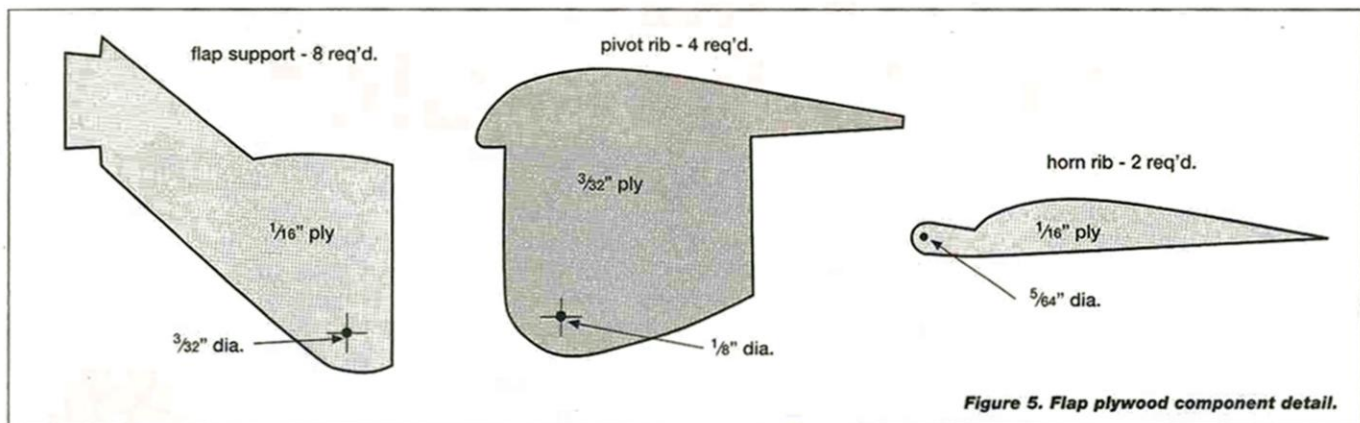


Figure 4. Flap pivoting supports and ribs.





error, (using a pin as a pivot), rotate the tracing clockwise to locate that point where the tracing matches the flap location exactly both "up" and "down." Mark this point clearly on the drawing as in Fig. 2.

Now, wing-flap and flap-supporting actuation structure may be detailed as in Figs. 3 and 4. The main spar is located at the airfoil's maximum depth. The rear-spar location should be sufficiently ahead of the flap leading edge to provide space for the flap horn and clevis, in the flap "up" posi-

tion (as shown). Note the low position of the flap horn; it and its clevis must clear the slot-lip as the flap is extended. It may be necessary to cut a slot in the lower aft spar for the sheath and cable, but the sheath anchor will reinforce that spar.

Now draw in the 1/16-inch flap support to lock into the aft spar as in Fig. 4, and the flap pivot rib in 3/32-inch plywood.

Two, 1/16-inch plys are needed for each flap support, one cemented on each side of a hard balsa 3/32-inch-thick rib. The 3/32-

inch ply pivot rib is sandwiched between the 1/16-inch ply flap supports.

To maintain the pivot in its correct location, subassembly of flap supports and ribs must be accurate for good flap performance.

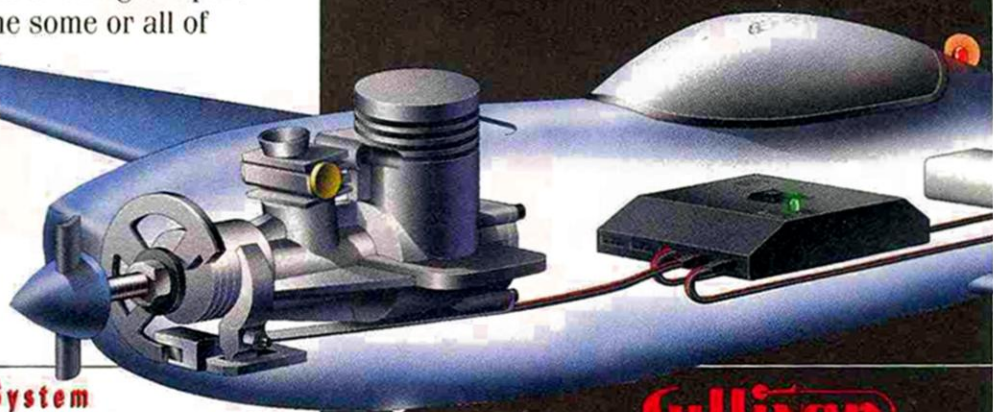
Fig. 4 also details the 3/32-inch balsa core and fairings to be added to the plywood and sanded to a low-drag symmetrical airfoil section. Note the 1/8-inch-o.d. brass tube bushing in the pivot rib and the 3/32-inch music-wire pivot. Fig. 5 details

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## SLOTTED FLAP DESIGN

the plywood flap supports, pivot ribs and horn ribs.

Standard servos for flaps and ailerons located in the wing center section provide adequate power. The stranded steel cables provide positive no-slop action. The ends of the plastic sleeves must be securely anchored in small balsa blocks (see Fig. 6).

Depending on the distance between pivot and flap horn, the servo travel for full flap extension may be inadequate. Futaba (and others) provide longer servo arms to provide greater travel. In extreme cases, it may be necessary to bolt longer arms on a standard horn or wheel.

Plastic sleeves (or sheaths) and cable should be bent to match the drawing before installation. A heat gun handle held in a vise leaves hands free to soften and bend the plastic sleeves to smooth curves.

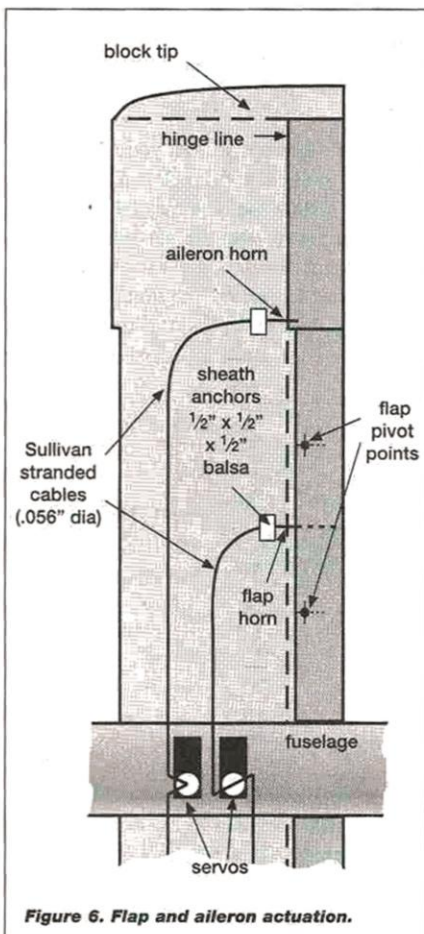


Figure 6. Flap and aileron actuation.

In Fig. 6, note the flap-pivot and flap-horn locations. Flaps 65-percent and ailerons 35-percent of the wing halves in length are suggested with aileron width 25-percent of the wing chord.

It is interesting to note that the respected "elder statesman" of model aviation, Bill Winter, has slotted flaps on a recent design, called the Soft Touch due to its gentle landing characteristics, flaps extended. ✈

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# Effective PROGRAMMING

by DON EDBERG

## CONTROLLING YOUR CONTROL

**T**HIS MONTH, I'm going to talk about some features that can make flying a model more of a pleasure. They have to do with the servo motion relative to stick travel (so duh! what doesn't on an R/C system?). Specifically, they affect the rate of servo response. In particular, I'm going to discuss three different ways of changing a servo's response: dual rates, exponential travel and variable trace ratio.

### SO WHAT ARE DUAL RATES?

Dual rates are found not only on computer radios, but all computer radios have them. At any rate (pun intended), you may have never used dual rates before. Dual rates (D/R) are a simple way of instantly changing control authority (the amount the servos move for a given stick position) by flipping a switch. Usually, they are available only for ailerons and elevator, although some systems also permit dual-rate settings for rudder. D/Rs are used for many reasons, among them that most models respond more rapidly to control inputs at high speeds, and it is possible to be really gentle with control inputs and yet still over-control. Dual rates are used to adjust the transmitter so that a control actuated at high speed will not cause a radical response, so they are very useful for beginning pilots. As you might imagine, you generally want to tone down the model's control throws.

Some radios have only individual dual-rate activation switches, while others allow you to combine the functions on one or two switches. You'll have to read your system's manual to determine whether your system is capable of joining the switch functions. Unless you have nimble fingers, you may want to choose to have all the D/R settings be activated by a single switch if you have that capability. The "one-switch-controls-all" dual-rate

selection is handy to minimize the number of switches that need to be flipped. You may have a choice of which switch direction produces high rates and which produces low rates. You should choose what feels right to you.

Some more expensive radios, such

moves 50 percent, or one-half of the distance it would if the dual-rate setting was not activated.

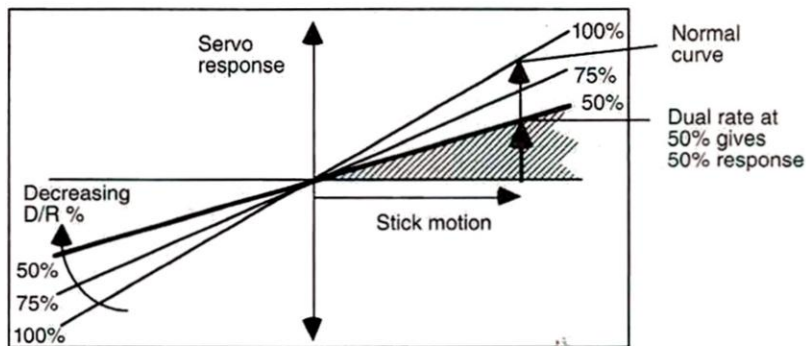
You can observe this effect by holding full control in one direction and flipping the dual-rate switch on and off. As you do, you'll see the control jump between full travel and the amount of travel reduction set by the dual rate. This idea is illustrated in Figure 2.



**Figure 2.** To see the effect of dual rate, hold full stick, and flip the dual-rate switch back and forth. The control (aileron shown here) will jump between full and reduced travel as the switch flips.

as the Airtronics\* Infinity 1000 and Stylus and Futaba\* System 8 and 9Z, allow you to have dual rates automatically turn on and off with a control position. This is particularly useful when you tie them into the position of the throttle stick, since the throttle often dictates the model's speed.

Most radios will let you set the dual rates anywhere from 30 to 120 percent. This means that you may be able to get more throw than the maximum of 100 percent, which is great for those high-control freaks! (If you do this, be careful not to exceed servo travel limits and cause stalling or excess current



**Figure 1.** A 50 percent setting cuts the amount of travel in half simply by flipping a switch. More expensive systems can be made to switch automatically depending on the position of another control such as throttle stick!

Figure 1 shows how dual rates affect the servos' response. You can observe this effect by programming in a dual rate, holding full control stick and flipping the activating switch back and forth: the control should move between full travel and less than full travel. Dual rates just reduce the normal response to the percentage that is programmed. For example, if 50 percent dual rate is selected, the servo

drain.) Also, some radios limit the minimum travel you can get. For example, many Futaba systems won't allow settings below 30 percent as a safety feature. Why? See the next paragraph.

At this point, I will issue a *warning!* Some Ace R/C\*, Airtronics and Futaba radios allow you to set zero percent throw under dual rates. If you switch to a zero percent setting, that servo will not respond to any stick movement; you will have zero control of your model and crash!

The dual rates you select depend on how the model responds to controls at



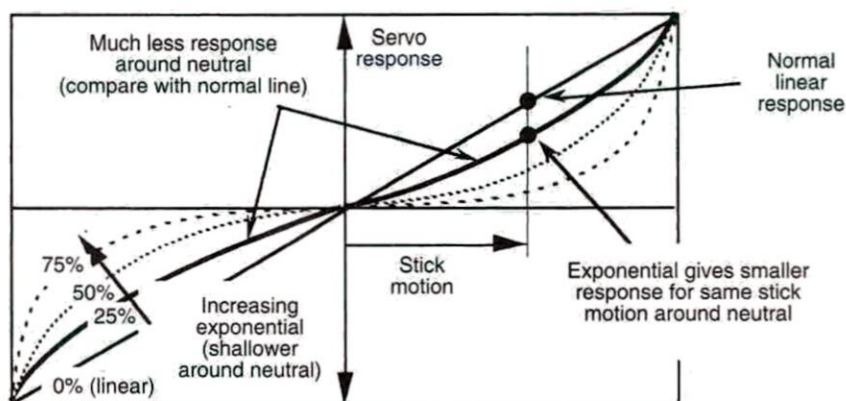
high and low speeds. You may find recommendations in the instructions if you are setting up a kit aircraft; otherwise, I normally recommend a value of around 66 to 75 percent for the "major" controls, aileron and elevator. Obviously, these settings depend on the pilot's preferences and model, so go ahead and fly it with the rates on and off, and change things to suit yourself and/or your style of flying. Rudder, in particular, may require more reduction under dual rates, but for aerobatic models, you may not want to decrease your rudder travel, since lots of rudder is needed for knife-edge flight. For rudder, you may want to consider using exponential settings (see below), or at least don't slave the rudder dual-rate switch to the others (if you have the capability).

Before I leave D/R, some radios have *triple* rate functions that allow you to select from among three different response rates—for the modeler who has everything, I guess!

## EXPONENTIAL: WHAT IS IT? WHY USE IT?

Exponential ("expo") is a mathematical term describing a curve that grows steeper the farther away you get from its starting point. When applied to an R/C system, expo is a way to get the effect of dual rates without having to flip a switch, since the farther you move the stick, the higher the servo response is. If this explanation doesn't make sense to you, refer to Figure 3 for an illustration of expo.

First, notice that the exponential curve in Figure 3 changes very smoothly. For this reason, it is possible to have low sensitivity at low stick angles (like dual rates) and yet have full motion at larger stick deflections. Many systems allow you to have two different values of exponential—one at each position of the toggle switches on the transmitter. These may or may not be the same switches that control dual rates, described earlier (consult your system's manual to find out for sure). To get a feel for how exponential works, just hold partial stick, and switch it on and off (if you can, or else switch from no expo to a value like 50 percent while holding partial stick). You'll see how it



**Figure 3. Exponential provides a smoothly varying control response to make flying smoother around neutral by reducing stick-to-servo action, yet it provides full servo travel with higher stick motions. Expo can be a great help for flying sensitive models smoothly. Notice that the higher the amount of expo, the less sensitive the model is near neutral, and the more sensitive it is away from neutral.**

affects the servo travel. Note that the travel with full stick should be the same in both cases.

Like dual-rate settings, the exponential values you input are highly dependent on both the model and pilot's preference. I normally recommend a small starting value, maybe 10 percent, and many test flights, slowly increasing the number until things are "right." Obviously, this depends on the pilot and model, so go ahead and fly it with expo only on one side of the switch (if your radio has this option), turn it on and off during flight, and change things to suit yourself. Or don't use it at all if you don't like it; it's not for everyone. I never liked the loss of sensitivity when I was younger and had better reflexes, but now as an "old man" of 40, I find it much more useful!

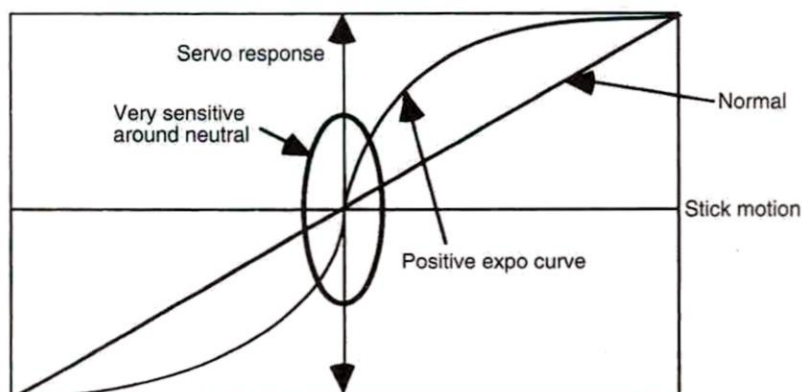
You might want to set a dual rate at one switch position with zero exponential and an exponential value with 100

percent dual rate at the other. Then you can switch between them in flight and decide which you like better. Later, you can combine both dual-rate settings and exponential on a single switch setting.

There is another kind of exponential, sometimes called "positive" exponential. Positive exponential is the opposite of the one we just described, and it is normally utilized to make the servos very sensitive around neutral and soft at extremes, as shown in Figure 4.

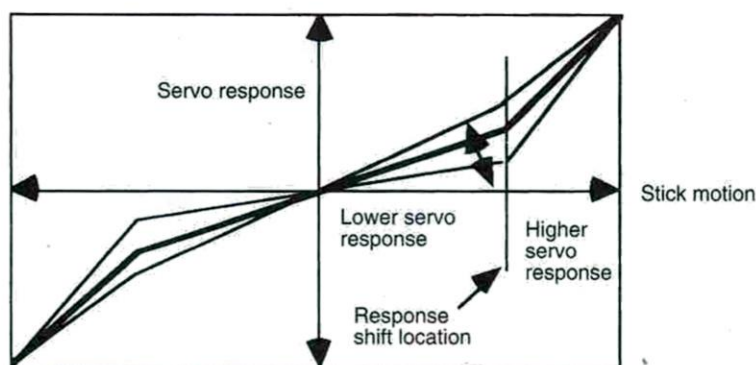
What the heck would you use this other kind of expo for? There are several possibilities: a model that feels "mushy" or "soft" around neutral stick could use it to make the model more "crisp." A chopper pilot could set his tail rotor so that not much rudder stick motion is needed to get the desired response, which is especially helpful with overcoming the damping due to high gyro settings in hover.

Occasionally, you'll find throttle



**Figure 4. Positive exponential makes things very sensitive around neutral—good for "mushy" models.**





**Figure 5.** Variable trace ratio (VTR) is like an "automatic dual rate." The rate changes after the stick has been moved a pre-programmed amount. Adjusting the VTR settings varies with radio system. Normally, you define how much stick motion is to occur and the amount of servo response at that point before the second line segment becomes effective. The maximum servo response is defined by the normal servo endpoint settings, also known as "travel volumes."

expo available as an option, presumably to better control the non-linear aspects of an engine's response to the carburetor opening. This is better handled with a "throttle curve" function, which I'll describe in detail in a future article.

#### VARIABLE TRACE RATIO

I'll close this month's piece with a description of another means of limiting control responses called "variable trace ratio," or VTR for short. This refers to a "bi-linear" (two joined lines) type of

response as shown in Figure 5. Looking at the figure, you can see that VTR can have two behaviors—a shallow one near neutral and a steeper one away from neutral. It combines the shift in control response found in dual rates with the "automatic" kick-in that occurs with expo. In fact, you can consider VTR an automatic dual-rate system, and some folks actually prefer VTR over exponential and dual rates because you don't have to flip a switch to get the high rates far from stick center. You can find VTR in

some radios made by Airtronics, older Futabas and older JRs\*.

Remember, if you write, send a self-addressed, stamped envelope to Don Edberg, 4922-2E Rochelle Ave., Irvine, CA 92604-2941. If you'd rather, you can email me at don\_edberg@CompuServe.com. I try to answer all mail, but sometimes it takes a while, so please be patient.

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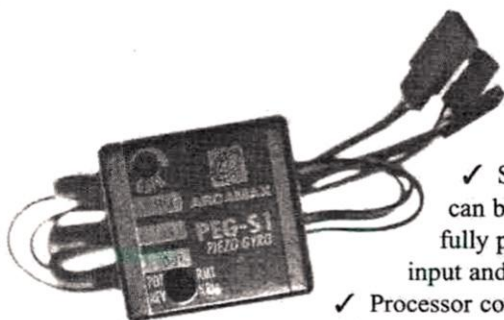
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# Scale **TECHNIQUES**

by **GEORGE LEU**

## TOLEDO TIDBITS

Aside from all the new products shown at the Weak Signals Toledo trade show, I always enjoy checking out the scale models in the static-display competition. Some really beautiful models show up, and this year was no exception. I don't have enough space to describe all the winners, but I do want to recognize their efforts and skills. I hope we'll see many of these aircraft on the competition circuit this year.

### BIG BOMBERS

Sometimes, the pen is quicker than the brain. In a previous column, I mentioned the growing interest in giant-scale WW II bombers and the unfortunate fact that few really big kits or plans were available. I was obviously premature in my comments, as I have since learned that Don Smith Plans\* has some really neat giant-scale WW II bomber plans. Don designs all-wood models, and Gary Madden of Madden Models\* is now kitting many of his designs. Included in the Smith/Madden kit lineup are a 138-inch B-17 Flying Fortress and a B-29 available in 141-inch or 168-inch-wingspan versions. Having seen other kits cut by Gary Madden, I am sure that these giants will be of the same topnotch quality. Don tells me that interest in big bombers is constantly increasing and he is continuing to design new models to satisfy the demand. If the mood hits you, give Don a call; many of his designs can be enlarged if you want something really big.

While on the subject of B-29s, at this year's Toledo show, I was fortunate enough to see Mike Barbee's newest scale model, a scratch-built 141-inch-span B-29 named "Sentimental Journey" from Don Smith Plans. Mike spent three years building his Superfortress and it is a



**Mike Barbee's all-silver Boeing B-29 Superfortress took second in Military Scale. Mike will be competing at Top Gun with this great-looking bomber.**

sight to behold. It is powered by four Saito\* .91 4-stroke engines and has an Airtronics\* Stylus radio with 22 servos for control. Finish is a combination of Coverite\* Presto, aluminum tape, lithoplate and Innovative Model Products\* Skinny Dip. The landing gear is from Century Jet Models\* and the wheels are from Glennis\*. According to the identification sign next to Mike's bomber, the model is dedicated to his late father, Lt. D. A. Barbee, B-29 pilot, USAF.

### CUSTOM COCKPITS

Also while in Toledo, I ran into scale competitor and *Model Airplane News*



**Jim Sandquist is manufacturing resin-cast instrument panels and vacuum-formed cockpit interior kits for scale modelers under a new company called Custom RC. Nice work, indeed.**

contributor Jim Sandquist. Jim has started a company called Custom RC\* and is producing instrument panels and cockpit interiors for scale modelers. Jim showed me some of his resin-cast instrument panels and I have to say, they look really good. Jim has been making scale cockpit interior parts professionally for a while now and presently is working on a full cockpit interior kit for the Mark Frankel T-34 kit. Jim also has a website where you can learn more about his service. You can reach the site at <http://www.pclink.com/flyboy> or you can send an email to [j.sandquist@juno.com](mailto:j.sandquist@juno.com).

### ARIZONA MODEL AIRCRAFTERS

I received a press package from a relatively new company that's supplying some very nice WW I scale kits and accessories. Arizona Model Aircrafters\* has an impressive collection of antique aeroplane stuff, including spoke-wheel kits, scale-engine and machine gun-kits, scale instruments and complete scale kits for the Fokker Dr.1, a Hansa



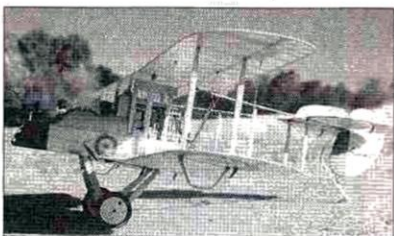
Brandenburg C1, three versions of the Nieuport (17, 24, and 27) and a de Havilland DH-1A (pictured here). The DH-1A was designed and built by John Cole and won fourth place at the 1996 Arizona Scale Masters. Each of these model kits is available in 1/6, 1/4 and 1/3 scale and comes complete with all hard-



**How's this for scale realism? Cast-metal ammo for your WW I fighter. Available in a variety of scales, these miniature machine-gun bullets come with their own leather ammo belt from Arizona Model Aircraft.**



**Also from Arizona Model Aircraft are kits for scale WW I gauges and instrument panels.**



**Typical of the types of kits Arizona Model Aircraft are manufacturing is this beautiful de Havilland DH-1A pusher designed by John Cole. The kit is available in different scales and with many scale fittings included in the kit.**

ware, paint stencils, spoked wheel kits, gun kits, scale cockpit parts, historical documentation and assembly manual. Arizona Model Aircraft also has scale brackets and turnbuckles in scale sizes from 1/12 to 1/3. Machine-gun kits include 1/6- and 1/4-scale Spandau, Lewis, Parabellum, Vickers and Schwarzlose M7/12. Except for the Lewis guns, each machine-gun kit includes 20 rounds of solid brass ammo and a leather ammo belt. There's a lot more in their catalog to whet your WW I appetite, so give Jamie or Carol a call at (602) 314-9937 and get a copy for yourself.

Well, that's it for this month. Next time, we'll have some photos from Top Gun and some techniques for making precisely fitting hatches.

## WINNERS

### Military Sport Scale

1st place, Mike Gross, Focke-Wulf 190-F2  
2nd place, Mike Barbee, Boeing B-29 Superfortress  
3rd place, Gary Bussel, Supermarine Spitfire Mk 14

### Non-Military Sport Scale

1st place, Darrell Rohrbeck, Rutan Long EZ  
2nd place, Mariano Alfafara, clipped-wing Cub  
3rd place, Gary Webb, Beechcraft Baron 58 twin

### Designer Scale

1st place, Frank Mizer, Felixstowe F2A  
2nd place, George Maiorana, B-29 Superfortress  
3rd place, Nick Zioli Jr., Grumman TBM Avenger

### Scale Jet

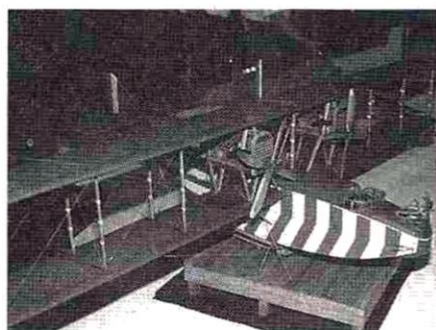
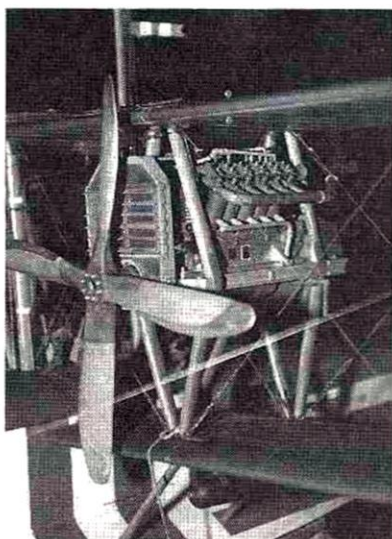
1st place, Joe Grice, F-4 Phantom  
2nd place, Terry Nitsch, P-80 Shooting Star  
3rd place, Frank McGroarti, F-14 Tomcat

### Helicopter

1st place, J. Michael Ellis, Bell 47-G2  
2nd place, Dan Clawson, Bell Long Ranger  
3rd place, Bill Ailes, CH47 Chinook

To all the scale winners, congrats!

*\*Addresses are listed alphabetically in the Index of Manufacturers on page 126.*



**First-place winner of Designer Scale at Toledo was Frank Mizer of Olmsted, OH, with his impressive Felixstowe F2A flying boat biplane. Frank's model is powered by two Fox .25 engines and has a lacquer finish.**



**Left: first place in Military Scale went to Mike Gross for his FW-190-F2. G-62 powered, the 190 was the first model built from the new Vailly Aviation\* plans. Right: Darrell Rohrbeck won first place in Non-Military Sport Scale with his 1/4-scale Rutan Long EZ. This is one homebuilt experimental aircraft we don't see very often in scale competition. Nicely done.**





# Golden AGE OF R/C

by HAL deBOLT

## SENIOR PATTERN ASSOCIATION

LET'S COMMENCE WITH news from the Senior Pattern Association (SPA). Chief SPA honcho Mickey Walker informs us that the organization is really gaining speed. The SPA promotes OT R/C with the use of aircraft predating 1965 in one class and 1976 in the other. Also, pilots are classed by age: under

News plan!

Apparently Dario "Quadra" Brisighella built a 'Ceptor exactly to the plans and later, for whatever reason, crashed it. Leo Martin acquired the remains, rebuilt it and found that it performed every bit as well as claimed.



In 1966, Dario Brisighella's Model Airplane News Interceptor and a Lanier ARF (one of the first ARFs).



At the SPA Masters meet, a gathering showing the diversity of models in competition. From left to right: Citron, Kaos, Daddy Rabbit, Tanglefoot, New Orleansian, Intruder and Lanier ARF. Real variety?

45, up to 65 and older than 65. The SPA offers a unique opportunity to compete with your cherished models—you don't need today's exotic birds!—and duel it out, friendly like, with flyers in your age group. Makes for a fun time!

This year, the SPA has sponsored meets in Augusta, GA, and Knoxville, TN, and meets are scheduled for August 23 and 24 in Cullman, AL, and September 13 and 14 in Smyrna, GA. For more information, contact Mickey Walker at 3121 Northview Pl., Smyrna, GA 30080.

In tune with the SPA comes a fine letter from Leo Martin of San Clemente, CA, with news of his adventures with what was my finest pattern design: the Interceptor, which predates 1965 and is a *Model Airplane*

After the plans became available, Dwight Hartman produced a fiberglass fuselage for the Interceptor. Leo thought it would be interesting to compare the glass-and-foam version with the original all-wood style, so he built another one. He found the glass-and-foam version considerably heavier, yet its performance remained excellent. As might be expected,

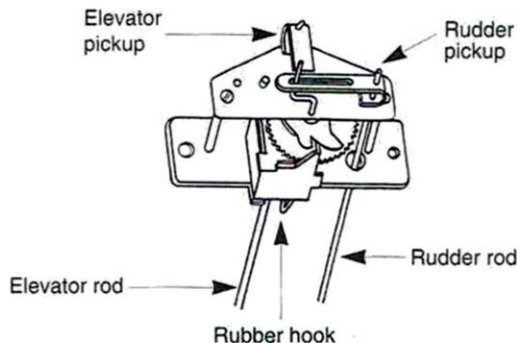
the lighter, original version maneuvered more easily and cleanly. Strange to have someone report today the same findings we both found over 30 years ago! I might add that the original did well with a Merco .49 for power. If you built the glass-and-foam version, you had to switch to a .60 to come close to the original's performance.

### CLEANING OUT THE ATTIC

Marty Matthews of Boulder, CO, is a Golden Age R/C'er who was thoughtful

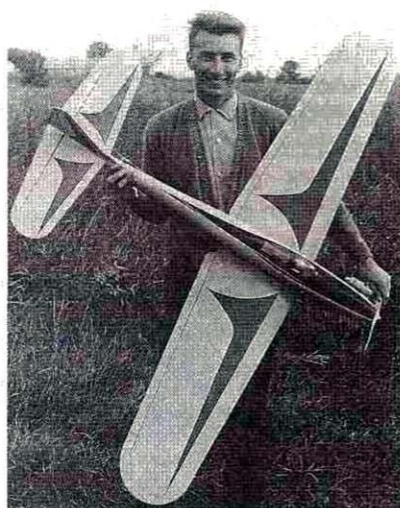
enough to send us some very early R/C stuff he uncovered while cleaning. This reminded us that so much was done so quickly in those days, in no way could one keep up with it all. Marty sent the instructions for a single-channel compound escapement offered by Babcock Models. This system was in contrast to the extensive efforts by the "pulse" advocates, who hoped to have rudder and elevator control.

Bonner had a very popular compound escapement to which you could slave a second escapement for another control. What is noteworthy about the Babcock compound is that the one escapement could operate both rudder and elevator! The sequence (all escapements required a succession of transmitter commands) was one pulse and hold for one rudder position, two pulses and hold for the other way. A third pulse and hold provided up-elevator; and transmitter off, everything neutralized. The action would be the same as when a slave escapement was used for the elevator. And there



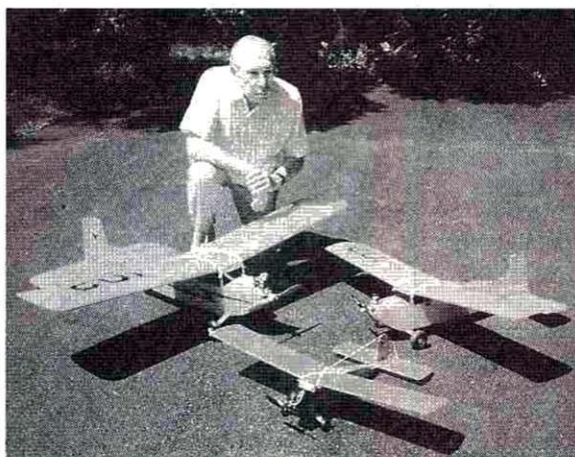
The Babcock Super Compound escapement provided two controls from one unit. A third control was possible by adding a slave escapement. Some stuff!





**Leo Martin with his Hartman fiberglass and foam version of the Interceptor. Leo built and flew it to compare it with the original wooden version.**

was more! The instructions included a modification that allowed the use of a second slave escapement for motor control: one pulse with no hold act-



**Bill Weaver of Middletown, MD, with his Live Wire Senior, Trainer and Kitten. All were built in the '50s, and all are still flying!**

uated the slave escapement for motor control. Wow! Three controls using only a single transmitter signal button. You just had to have timing ability à la Liberace's fingers!

Of interest may be another difference in early radio operation. With today's radios, when you turn the transmitter on, a constant signal is sent to

create a positive connection with the receiver. With most early radios, the transmitter signal was normally off; you had to push a button switch to send the signal. See the possibility? With no signal from your transmitter, most of the time, your receiver could accept a signal from another source, thus the familiar cry of "Interference!" We've come a long way. Imagine to what lengths the early birds went while attempting to acquire what is taken for granted today!

The last I heard from Bill Weaver of

## BILL EFFINGER'S SCRAPBOOK

OT R/C pioneer Bill Effinger of Berkeley Models fame kindly dug into his archives to provide some reminiscences. Enjoy!



**A Ben Sheresaw-designed Berkeley Custom Cavalier wings its way skyward on a late '30s spring day.**



**Above: Henry Struck's prototype Berkeley Navion kit became a popular choice for R/C use.**

**Below: Dick Korda accepts the Wakefield Trophy from meet sponsor Bernard McFadden. A truly famous day in modeling!**



**The Wakefield event was in the USA, and Model Airplane News was there! Editor Charlie Grant was seen with sponsor Bernard McFadden.**



**Right: in '39, the New York World's Fair was the talk of the town. Modelers were there! A competition was offered for these Navy scale types.**





Middletown, MD, was in '95. Bill reported that he had supplied some of you with over 100 Live Wire plans. Point here is, does anyone know of Bill's current status?

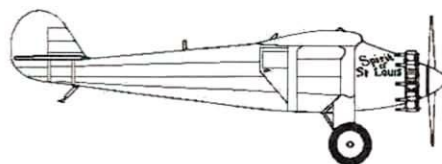
#### RADIO IMPROVEMENTS

From Nelson, B.C., Canada, George Penniket tells us he broke into R/C in '65 with a Goldberg Jr. Falcon. Joe Wagner helped him back then, and they still keep in touch. George also included some insightful information from the mid-'60s. Do you recall that Midwest Products offered WW I sport-scale kits for R/C? A Nieuport 17 and a Fokker D7, each powered by a .15 to .19 engine and said to be able to use from a 1- to 5-channel radio. Price was an impressive \$19.95. No word as to what 5-channel radio of those days would be light enough for the 44-inch-span models!

E-K featured a full-page ad announcing a 14-ounce mini-propo system with advanced features, including linear output servos with only three wires instead of the previous four; a double-tuned RF amplifier receiver; and single- and dual-stick transmitters. Things were improving! It cost \$470; compare that to the cost of radios today! Also offered was an E-K Digi-Ghost pulse system featuring three controls; digital propo apparently had yet to replace pulse completely.

Examples of pulse still surviving in that same time period were Ace R/C's offerings. Ace was prominent with control systems in those days. Their Pulse Commander was offered in two single carrier wave versions: single control and a three-control type. The use of Adams or Rand actuators followed the on/off pulsing. A feature aimed at beginners was the initial cost of \$75. Supposedly, as you advanced, you could add more controls—up to a max of \$140! Ace always made a great effort to fill our needs and bring newcomers to R/C.

As with all our other contributors, thanks much, George! That's it for this time; do remember, this is *your* OT R/C place!



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black, glass-filled nylon	9x4, 9x5, 9x6, 9x7, 9x8, 9.5x6. ....\$1.69
5.5x4, 5.5x4.5 .....	10x4, 10x5, 10x6, 10x7, 10x8,
6x3, 6x3.5, 6x4 .....	10x9 .....
7x3, 7x4, 7x5, 7x6 .....	11x4, 11x5, 11x6, 11x7, 11x7.5, 11x8,
8x3, 8x4, 8x5, 8x6, 8x7 .....	11x9, 11x10 .....
	\$1.29
	\$1.29
	\$1.39
	\$1.49
	\$1.99
	\$2.19

### K Series



black, glass-filled nylon	14x6, 14x8. ....\$5.59
12x6, 12x8 .....	15x8, 15x10 .....
13x6, 13x8 .....	16x6, 16x8 .....
	\$5.59
	\$6.59
	\$7.59

### Classic Series



black, glass-filled nylon	18x6, 18x8, 18x10 .....
16x6, 16x8, 16x10. ....	20x6, 20x8, 20x10. ....
	\$13.25
	\$15.25

### Scimitar Series



charcoal gray, glass-filled nylon	11x6, 11x7, 11x8. ....
7x4, 7x5, .....	12x6, 12x8 .....
8x4, 8x5, 8x6 .....	13x6, 13x8, 13x10 .....
9x5, 9x6, 9x7 .....	14x8, 14x10 .....
10x5, 10x6, 10x7, 10x8 .....	
	\$2.29
	\$2.99
	\$4.29
	\$5.99
	\$2.09

### Wood Series



beechwood or maple	14x6, 14x8, 14x10 .....
9x4, 9x5, 9x6, 9x8 .....	16x6, 16x8, 16x10 .....
10x5, 10x6, 10x7, 10x8 .....	18x6, 18x8, 18x10 .....
11x6, 11x7, 11x8, 11x10 .....	20x6, 20x8, 20x10 .....
12x6, 12x8, 12x9 .....	22x8, 22x10, 22x12 .....
13x6, 13x8, 13x10 .....	24x8, 24x10, 24x12 .....
	\$5.55
	\$9.50
	\$15.00
	\$17.00
	\$19.25
	\$21.00

### Electric Wood Series in beechwood

Undercambered blades!



10x6, 10x8 .....	12x8, 12x10 .....
11x7, 11x9 .....	13x8, 13x10 .....
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	\$4.25
	\$4.45
	\$4.65

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**MODEL  
AIRPLANE  
NEWS**

# PRODUCT REVIEW

**WE SPEND** LOTS of money on radios because we know they are the only link between us and our models.

We spend lots of money on engines because we know that proper power and reliability are requisite for consistent flying. We spend lots of money on the models themselves because they're cool. But when most of us buy our sunglasses, we nickel-and-dime the purchase.

# Newman Optics Sunglasses

*See better while  
protecting your eyes*

by LARRY MARSHALL

I've been flying for a long time, and I have spent a lot of hours looking up into a bright sky. I've purchased many pairs of sunglasses to combat the sun. I've had dark ones, light ones, yellow ones and green ones. I've had ordinary sunglasses, and later in life, I've had sunglasses that clipped onto my prescription glasses. Heck, at one time I even had a big piece of dark Plexiglas that used to cling to my TX antenna so I could hold it between my eyes and the sun when needed. But for each of these "experiments" I never spent more than the cost of a bottle of fuel. In hindsight, it's not too surprising that I never found a good solution.

But that has changed, as I now own Zurich sunglasses from Newman

Optics. I tried them when I realized that there is truth to the ad copy from Newman Optics, that our eyes were not designed to spend hours looking up into a bright sky, so better eye protection was probably a good idea. But I was surprised to find that in protecting my eyes, I gained something else. I could see my aircraft much more clearly. Zurich sunglasses improve contrast in a way that simply gives you improved visual contact with your aircraft. I also found that my eyes didn't tire during an afternoon at the flying field.

According to the documentation that came with the sunglasses, there are clear reasons why these lenses are so much better. First, they are made from prescription-grade polycarbonate plastic rather than cheaper structural-grade plastic. The molds used are formed to prescription standards—at much higher cost—and the result is a lens that's superior to those of the cheaper knock-offs. Zurich lenses block most ultraviolet and 65 percent of infrared light; this decreases the potential for eye damage while reducing the eyestrain we R/C pilots experience. Further, Zurich lenses selectively filter blue light, making aircraft on sky backgrounds show up more clearly. Zurich also uses a process called "Triploid," which is an improved polarizing technique that reduces not only reflected light but also direct light, as when we fly close to the sun. This further cuts glare and improves our ability to see the aircraft.

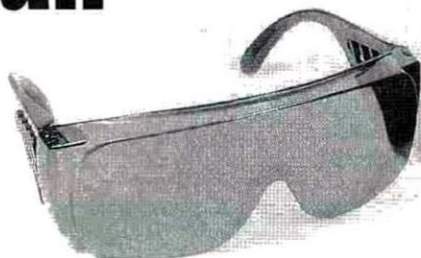
One added benefit is that Zurich glasses exceed ANSI Z.87 standards for safety glasses. They are capable of stop-

ping a 12 ga. shotgun pellet from 30 feet. This should be good news for those familiar with the new AMA race regulations requiring safety glasses. It also provides considerable safety benefit to those working with models in pit areas where a shed blade or a piece of gravel sent flying from propwash could be prevented from causing eye damage.

Zurich sunglasses are available in six different tints as well as gradient tinting, the choice of which is made based upon user needs. I only have experience with the dark "Teal" lenses, so I recommend that when you order, you call Boyd Newman and explain why you want them; he can help you select which tint is right for you. Each pair of Zurich lenses comes with a Neofoam case that I've found quite handy.

One thing that I appreciate is that these glasses fit comfortably over my prescription glasses. Also, because of the wrap-around nature of Zurich lenses, they keep wind from getting behind my glasses, which always caused my eyes to water when I was slope soaring or it was cold. In spite of the wrap-around feature, I find these lenses actually improve my peripheral vision rather than inhibit it. I can't offer an explanation for this, but it does seem to be the case.

You can get more information and/or order a set of Zurich sunglasses from Boyd Newman of Newman Optics at 5083 Ridgedale Dr., Ogden, UT 84403; (801) 476-1177; fax (801) 479-7733. Prices range from \$59.95 to \$69.95.



PHOTOS BY WALTER SOKAS





## SKS VIDEO 8th Jets Over Deland

This 74-minute, digitally mastered video features Dan Starkey's micro Hawk, Donald Imrie's F-15, Lynn Stevens' swing-wing Tornado, Eddie Weeks' Sport Turbine, Dave Carter's F-18 and more. It also includes interviews with the pilots and the

Tech Tip of the Day.

Price—\$19.95 plus S&H.

SKS Video Productions, R.D. 1, Box 264, Pine Rd., Abbottstown, PA 17301; (800) 988-6488 or (717) 259-7193; fax (717) 259-6379; email [sksvideo@cyberia.com](mailto:sksvideo@cyberia.com); website <http://www.yorkpa.com/sks>.

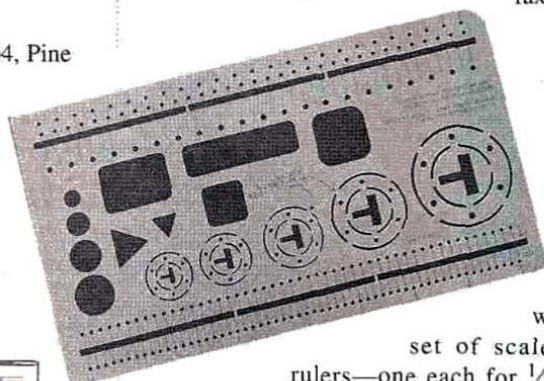


## HITEC RCD INC. HS-85BB Servo

Hitec's most powerful and durable microservo yet, the HS-85 mighty micro is a top ball-bearing-supported servo that offers 38 oz.-in. of torque. At .70 ounce and 1.0x0.5x1.1 inches, it's the perfect choice for hand-launch gliders and high-speed slope soarers. It comes with your choice of Airtronics, Futaba, Hitec or JR connectors.

Part no.—31085; price—\$58.95.

Hitec RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071; (619) 258-4940, fax (619) 449-1002.



## TOP FLITE Scale Warbird Templates

This clear, sturdy polypropylene template allows you to add authentic scale detail to your warbird in minutes. It also features a

set of scale rulers—one each for 1/3 through 1/7 scales. Each 8-inch segment shows the distance marked off in scale inches, and all feature tiny holes that are perfectly sized for adding rivet detail.

Part no.—TOPR2187; price—\$9.99.

Top Flite; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008; website <http://www.hobbies.net/topflite/>.



## TELSTAR VIDEO PRODUCTIONS INC. 1st Jet World Masters

This 2-hour video shows the highlights of the first ever world competition for jet models. Jets from 14 countries, including turbine-powered 747s, twin-engine Su-27s and twin-turbine-powered Rafales are highlighted.

Price—\$21.95 plus \$3.25 S&H.

Telstar Video Productions Inc., 483 SE Monterey Rd., Stuart, FL 34994; (800) 972-4847; fax (561) 220-4849.

## ASTROFLIGHT Super Boxes

These high-ratio gearboxes are now available for giant-scale applications. Model 714 fits AstroFlight Cobalt 60 and 90 motors; Model 713 fits Cobalt 25 and 40 motors; Model 712 fits Cobalt 15 motors; and Model 711 fits Cobalt 035 motors.

Prices—\$79.95 (Model 714); \$69.95 (Model 713); \$59.95 (Model 712); \$54.95 (Model 711).

AstroFlight Inc., 13311 Beach Ave., Marina Del Rey, CA, 90292; (310) 821-6242; fax (310) 822-6637; email [info@astroflight.com](mailto:info@astroflight.com); website <http://www.astroflight.com/astroflight/superbox.html>.

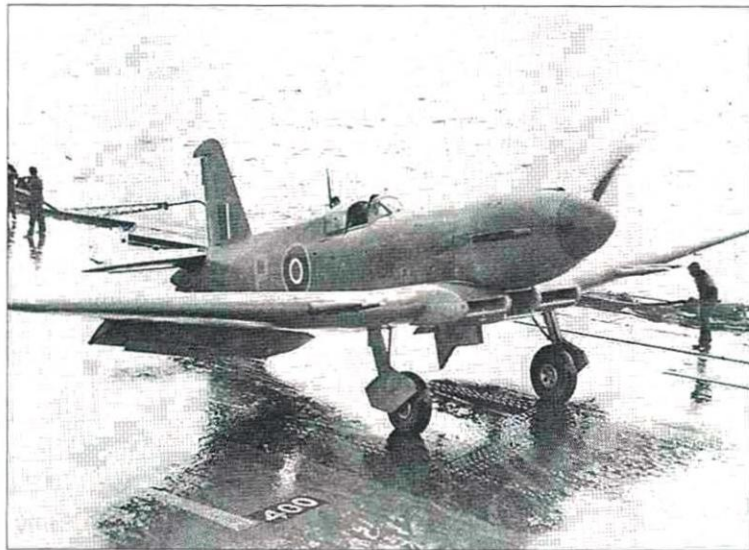


Descriptions of products appearing in these pages were derived from press releases supplied by their manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Model Airplane News, nor does it guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Model Airplane News. Manufacturers! To have your products featured here, address the press releases to Model Airplane News, attention: Product News, Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606.



# Name **THAT PLANE**

## CAN YOU IDENTIFY THIS AIRCRAFT?



If you can, send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

Congratulations to David Jones of Evanston, IL, for correctly identifying the May 1997 mystery plane. Built in 1937, the Seversky SEV-DS *Doolittle Special* was a modified, executive version of the P-35, a single-seat pursuit plane that was the precursor of the P-47. Jimmy Doolittle



used the aircraft featured in the photo to test high-octane fuels when he worked at Shell Oil Co. The high-speed plane was powered by an 850hp Wright-Cyclone engine and had a polished-metal finish. Thanks to all who wrote in; good luck next month!

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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0.007"	1.0"	\$40.00	\$30.00
0.014"	0.25"	\$25.00	\$18.75
0.014"	0.375"	\$27.50	\$20.65
0.014"	0.5"	\$35.00	\$26.25
0.014"	1.0"	\$60.00	\$45.00

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### HOW-TO ARTICLES WANTED

Do you have a construction technique, building method, or design innovation that you'd like to share with readers?

Why not publish your ideas in *Model Airplane News*? For more information, contact associate editor Debra Sharp (203) 431-9000; e-mail: [debs@airage.com](mailto:debs@airage.com)

**MODEL AIRPLANE NEWS**

**HOW TO**



## CLASSIFIEDS

## BUSINESS

**SCALE AIRCRAFT DOCUMENTATION** and resource guide. Larger, updated 1997 edition. World's largest commercial collection. Over 6,400 different color Foto-Paaks and 35,000 three-view line drawings. 204-page resource guide/catalogue—\$8; Canada—\$10; foreign—\$15. Bob Bank's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. [3/98]

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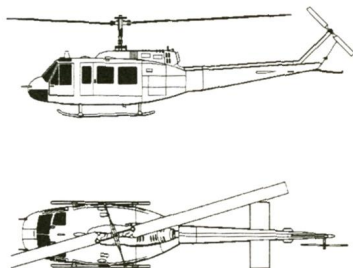
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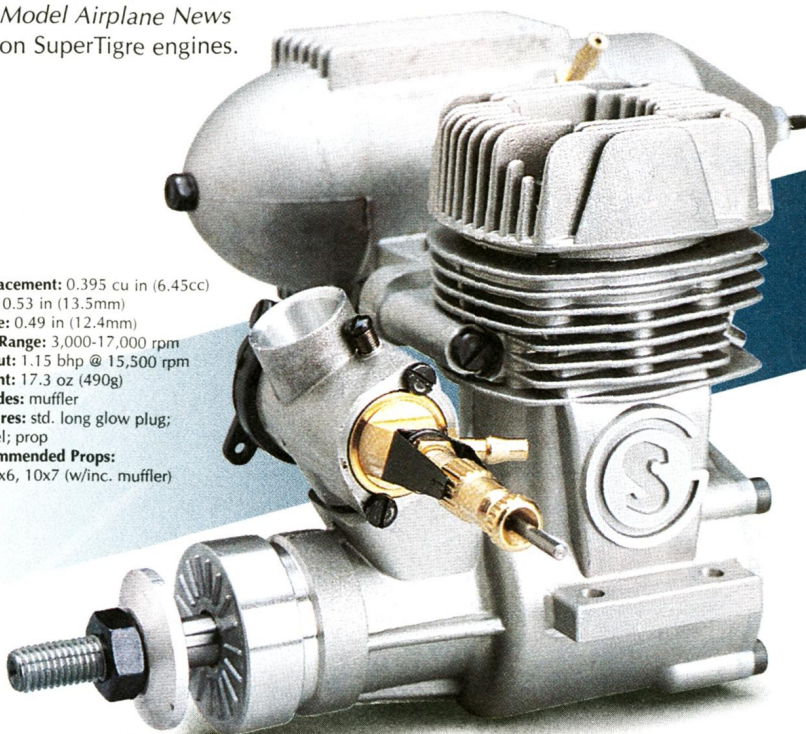


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# Final **APPROACH**

## HIGH-ALTITUDE TEST BED

**C**enturion, a 1/4-scale prototype of a proposed ultralight flying wing, may just be the highest aspect ratio flying wing model ever built. The brainchild of AeroVironment Inc. Design Development Center (DDC) of Simi Valley, CA, its sole purpose is to pave the way for full-size high-altitude, solar-powered aviation. AeroVironment is a member of NASA's Environmental Research Aircraft and Sensor Tech-

are associated with developing, building and testing full-scale aircraft.

Meininger says, "We find that we can make configuration changes very quickly and very cost effectively, then immediately test [the model] and come back and change it if necessary. It allows us, in a very short time, to get a lot of test data and also do the risky things that normally you wouldn't want to do with a full-scale aircraft. By the time we get to the final aircraft stage, we should only be doing minor changes and fine-tuning."

The mission of the full-size Centurion, which will have a 210- to 240-foot wingspan, will be to climb to an altitude of 100,000 feet using electric motors powered by solar cells spread across the wing's upper surface. While the aircraft glides at altitude for two hours, a small, 200-pound payload of scientific sensors will sample air without the contamination that occurs when latex weather balloons or high-speed airplanes are used.

The model has a 62 1/2-foot wingspan with a 2-foot chord and weighs only 25 pounds for a wing loading of a mere 3.2 ounces per square foot. Its carbon-fiber and Kevlar main spar contribute to its low weight, and the only balsa you'll find in this mega-model caps its foam-core ribs. Centurion's leading edge is made of Styrofoam, and the entire model is covered with Mylar film. Twelve 7.2V Speed 400 motors on 32 Ni-Cd cells and swinging 6x3 black nylon props are more than enough power for the giant.

nology (ERAST) program, which is sponsored by NASA's Dryden Flight Research Center. Centurion project manager Rik Meininger says that approximately 70 percent of AeroVironment DDC employees are diehard modelers, and he jokes that having experience in the hobby has almost become a prerequisite for being hired. Meininger, a 30-year modeling veteran, notes that as well as having practical experience, modelers also tend to be very creative and team-oriented—assets that are extremely important in this field.

Using R/C models to test aerodynamic designs allows the AeroVironment team to experiment, brainstorm and troubleshoot without investing the considerable time, energy and tax dollars that



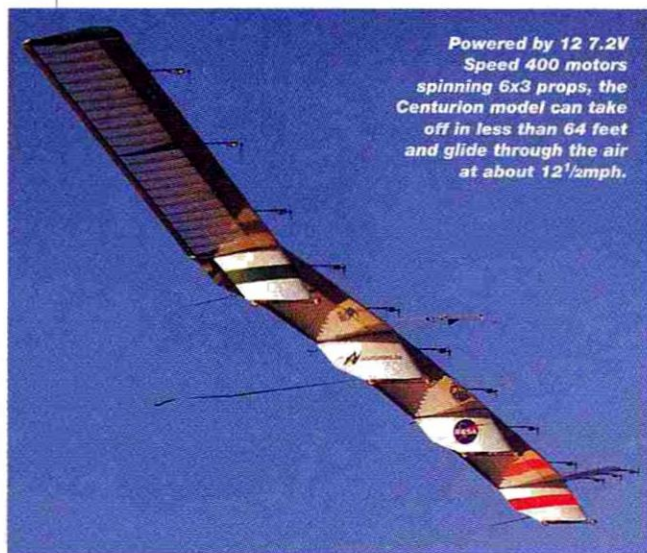
**Rik Meininger, Centurion's project manager, checks the airfoil alignment on the model before its first flight test.**

Initial test flights at El Mirage dry lake in Southern California were "fantastic," says pilot Wyatt Sadler. "The aircraft exceeded our expectations, and it had a turn rate that was almost two times as fast as what the engineers had predicted." Although turbulence during the test flights tossed the model in the air and caused the wing to flex considerably, Sadler—an accomplished modeler and R/C pilot with more than 17 years in the hobby—was able to maintain control by adding differential power (throttling up three motors on one side and throttling back three motors on the other side). Differential throttling is the only way to steer the model. Elevator control is accomplished via five microservos on the flight surfaces; these servos are wired together in an intricate bellcrank system so the surfaces move together as one large elevator. During the test flights at El Mirage, the aircraft flew more than 1 hour, 40 minutes during 13 flights.

Bill Parks, Centurion's chief designer and operations manager, says, "We'll take the data from these flights and incorporate them into the design of the full-scale proof-of-concept vehicle."

For now, the Centurion model is grounded, awaiting some modifications and the chance to once again awe spectators with its stability and grace in the air. "This thing is awesome," says Meininger. "You've just got to see it fly to believe it."

—Debra Sharp



**Powered by 12 7.2V Speed 400 motors spinning 6x3 props, the Centurion model can take off in less than 64 feet and glide through the air at about 12 1/2 mph.**



**Centurion's 62 1/2-foot straight wing is in five spanwise sections that are supported by four underwing pods.**